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JPRS-EST-88-006
1 AUGUST 1988

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ADVANCED MATERIALS

Italy's Snia Bpd To Develop Composite Materials

3698M359 Milan ITALIA OGGI in Italian
29 Apr 88 p 5

[Unattributed article: "Snia Bpd Will Produce Composite Materials"]

[Text] Milan—Yesterday, Molding Systems, a company belonging to the Snia Bpd group, officially opened the Center for Composite Material Development and Applications at Castellaccio di Paliano (Frosinone). The center, which is equipped with a CAD system, a quality control laboratory with all the necessary equipment for composite material transformation in line with leading edge technology, is responsible for the designing, formulating, and production of advanced materials obtained through the combination of technical fibers (glass, Kevlar, carbon, and ceramics) with resins.

Technomaterials produced in this way will be particularly suitable for being used in various sectors: aeronautics, ground transportation, components for defense industry and sports (formula 1, skiing, aquatic sports, etc.).

Pier Giorgio Romiti, Molding Systems manager, announced: "The companies operating in composite materials, that is, Molging Mivi, Cassoni, Seal, and Texipreg posted sales of 33 billion lire in 1987. We expect to reach 90 billion lire within the next 3 years."

08606/08309

AEROSPACE, CIVIL AVIATION

Hermes Development Phase Outlined

3698M393Munich DORNIER POST in English
No 2, 1988 pp 40-44

[Article by Peter Kania: "Hermes at the Start of the Development Phase"]

[Text] After several years' studies within the Hermes Preparatory Programme (HPP, Phase A and B), the programme reached it as yet most important milestone in early November 1987: the ESA ministerial conference had to make a joint decision on the beginning of the Hermes development phase (Phase C/D) and the programmes which are immediately linked with the spaceglider project, namely Columbus and Ariane 5. To the great joy of everybody concerned, it was decided to enter into a predevelopment phase (Phase C1) in early 1988, which would end in late 1990. Before the end of this period, it must be decided on the basis of the results obtained, whether a full development commitment is made up to and including the start of two flight models. The Governments concerned had time until mid-February 1988 to support their Ministers' decisions by a binding promise to provide the required budgetary means. The Federal Republic of Germany is the second programme partner after France, which ensures a good starting position for the distribution of programme shares to the German industry.

The non-participation of some ESA members, however, should not go unnoticed, with Great Britain being the most significant one. If this situation does not change, some new work distributions will be required in several fields because of Britain's originally quite remarkable share of three to four percent.

When talking to the "overall programme" or "total system", we think of all fractions, in the largest sense, from the orbital systems and launching facilities for Ariane 5, via navigation and communication equipment and other external ground systems to payloads and their operators on board the spacecraft. More restricted are the terms "space segment" and "ground segment" which include the essential components, namely the spacecraft and the flight control centre, respectively. The term Hermes designates the spacecraft only.

Task definition for completeness' sake, the essential tasks of Hermes—the references missions—shall be briefly outlined:

- The primary reference missions is the operation and maintenance of the Man-Tended Free-Flyer (MTFF) of the Columbus programme in its 463/28.50 orbit; Hermes will be optimized for this purpose as the MTFF is regarded as the predecessor of future European space stations.

- The secondary reference missions are

—a long-term connection with the MTFF (23 docking days)

—support and maintenance of automatic platforms in different orbits such as the PPF Polar Platform of the Columbus programme (276 km/98.6°)

—visit of American, Soviet and other space stations

—autonomous, as yet not precisely defined missions.

These reference missions can lead to a modification of the basic definition in some discrete aspects.

In a larger, non-technical sense, the tasks of the Hermes programme is

- to provide an essential element of a West-European orbital infrastructure and thus contribute to the autonomy of the ESA member states in space;
- to transport human astronauts safely into low orbits and back to Earth;

- to contribute to developing the industry in participating nations in the high-technology field.

The second point provides a reason for discussing a basic—and actually the most comprehensive—aspect of the whole programme.

Experts are discussing fervently whether at the present time, in view of the not yet fully mastered risks, manned space flight is necessary, reasonable, or justifiable.

The work expected from an astronaut could be performed as well—if not better, when thinking of certain sensorial and manipulatory deficiencies of homo sapiens—by robots which can be controlled safely from an armchair in the flight control centre. Of course, a striking counter- argument would be that this is not entirely feasible in case of unexpected events, but this argument is not enough to refute these doubts in principle. It is uncontested, however, that the presence of man

- on the 8000-m summits of the Himalayas
- in the depths of the oceans
- in supersonic aircraft, and finally
- in outer space

provides elementary drives which are needed by mankind for its further development—if this rather emphatic declaration is permitted.

It is neither the often quoted teflon-coated frying pan which constitutes the real value of space research nor is it in the very last instance the communications satellite for the transmission of topical events. "Man in space"- means fascination and is an aim which can be pursued over many generations up to the physical and astronomical limits. That is its real value. From the purely technical point of view, a "sound-mixture" of robots and men seems to offer the optimum solution for our problems.

Industrial Organization

The development of the space and ground segments of the Hermes programme was delegated by ESA to CNES, the French space agency (Centre National des Etudes Spatiales), which has set up a "Direction Hermes et Vols Habite's" in Toulouse. The industrial main contractor for Hermes in Aerospatiale (AS), with Dassault-Breguet (AMD) as co-contractor for the aeronautical parts of the development—mainly the calculation of trajectories, aerodynamic configuration, and the load-bearing, so-called "cold, structure. It is hardly surprising that programme leadership has been unambiguously attributed to France. The idea for the programme and the first technical studies of AS and AMD date back to around 1977, after all.

Both companies have set up a joint overall project management organization a few years ago, the "Groupe Technique de Projet" (GTP). It consists of seven technical departments with a staff of fifty at present. The programme office formed by representatives of both companies, as well as the departments for contract and project control and quality assurance are housed in the same building at Toulouse- Blagnac.

Since March 1987, GTP is no longer a purely French institution. The Federal Republic of Germany had the privilege to participate and its first staff quota has been on the project control: 16 technical staff, one product assurance expert, and one secretary.

This remarkable development was facilitated by the setting up of the Deutsche Hermes-Gesellschaft (German Hermes Group) with the participation of the five German companies that are most concerned with the Hermes programme. The aim of the group is to form a public limited company (GmbH) under the name of DHG; its shareholders are the aerospace systems companies MBB and Dornier, plus AEG, ANT, and MAN. They delegate seven, five and two each, respectively, of the German engineers in GTP. Hermes has been subdivided into subsystems for some time and most of them have been passed on the different European companies. The tasks which still have to be attributed are mainly concerned with large structural components. Dornier is a safe candidate for these, judging by the state of the preselection.

Engineers from Dornier System and "aircraft builders" of Dornier GmbH, who have already made their contributions in the field of aerothermodynamics, will find an important field of activity here. The software task also is very significant as it is at least equivalent to a subsystem leadership because of the deliberate independence from the basic software manufacturers.

Dorners's firm intent to supply contributions to the ground segment as well should be underlined. Activities concentrate on a participation in the Hermes Flight Control Center (HFCC), but the development and retrofit work for a trainer aircraft to train Hermes pilots (Hermes Trainer Aircraft—HTA) also would be a great task for Dornier GmbH and Dornier Reparaturwerft GmbH because of the simulation of landing approach characteristics and the cockpit modifications.

It is certainly not necessary to mention that all tasks will be implemented to ESA rules in cooperation with other companies and the partner nations. It would lead too far to name all the partners of Dornier in this field.

Back to Deutsche Hermes Gesselschaft: Its declared aim, together with the BMFT (Federal Ministry for Research and Technology) is to raise the position of the German industry from that of a component or, at best, system supplier to that of a responsible system leader.

In view of the Challenger catastrophe and the increased call for safety it entailed, a decision was made to equip Hermes with a rescue capsule that includes the whole cockpit. In an emergency, it would separate from the spacecraft after the launch and up to an altitude of about 60 km and return to Earth as an autonomous flight vehicle carrying the astronauts.

This "system within the system" offered a solution to the organizational problem: after tough negotiations, DHG has been awarded development autonomy for the CEM (Crew Escape Module). Besides the overall layout and the integration including the relevant tests, this comprises the study of all events and systems connected with the rescue process, including their specifications and all development tests. The delivery of components is not included, but the usual call for tenders will be applied.

According to an agreement among the partners, Dornier will manage two of the five technical work packages and essential parts of systems engineering. IABG (Industrial Facilities Operating Society) will participate in the planning of test facilities as well.

In the largest sense—that is, not as a sub-system—the Hermes programme also comprises the spacesuit system, known by the abbreviation EVA (Extravehicular Activities). Should Dornier be awarded the contract as system leader, it will cooperate with its partner from the Alpha Jet programme, Dassault.

In its Transport and Orbital Systems Subdivision of the space division of the Dornier System GmbH, Dornier has set up a Hermes project management office which is to control all Dornier activities within the Hermes programme. In this way, the company hopes to account for the expected work in the different special fields during the expected period of more than ten years for the development alone.

Selected Technical Aspects

The aerodynamic configuration of Hermes—wing platform and profile, wing and tail unit arrangement-fuselage contour—has been derived by iteration and has been fixed for some time. Further development on the basis of new investigations—for example with new measurements in the hypersonic field—will probably concern details only. The configuration that forms the basis for the present work is designated 5M2.

The interior design was thoroughly changed one year ago: The Crew Escape Module was added and the fuselage interior designed as an enclosed pressurized tube. The large doors on the fuselage upper side were development from payload bay doors to mere radiator covers. Finally, the orbital thrusters were placed into the Ariane-5 adapter, and the airlock was taken from the area behind the cockpit and placed to the fuselage rear.

The last stage, which could form the basis for detail work, has not yet been reached. As the additional weight of the CEM causes some headache, further configurations are studied in a temporary design office created by AS at Les Mureaux near Paris (Bureau d'Etudes d'Avant-Projet—BEAP). When Hermes is not regarded alone but as an integral part of the new orbital system, there can certainly be new solutions for weight distribution.

The financial means agreed by the Ministers' Council in The Hague for the C1 predevelopment phase amount to 530 MAU (million accounting units). This is not quite as much as was calculated in the long-term plan, so priorities must be set for the work to come.

Dornier-Activities and Interests

System Level
—Participation in the System Project Group
—Participation in the Crew Escape Module Development
—Lead in Software Verification*)
—Lead in EVA Suit System*)
—System Studies, e.g. aerothermodynamics, missions and operations

Subsystem Level
—Lead in Environmental Control and Life Support System
—Lead in Fuel Cell Power Plant
—Competitor in Fuselage and Launcher Adaptor Structures
—Competitor in Groundsegment Tasks, e.g.

- Flight Control Center
- Trainer Aircraft

Assemblies and Equipments
—Lead in HERA Manipulator Joints*)
—Lead in Deployable Antenna*)
—Bidding for a wife variety of Further items

*)Not yet contracted

Activities serving to eliminate technical risks have first priority. In addition, long-term developments which must be ripe for decision in 1990 must be treated first. The greatest attention is, therefore, devoted to the following fields:

- aerodynamics
- thermal protection
- "cold" structures
- fuel cells
- software
- crew equipment (mainly EVA).

To make fast progress with the load-bearing "cold" structure—so called because it has to resist "only" about 250°C, which is little compared to the "hot" structure of thermal protection which is locally heated up to

1700°C—while taking into account the many participating organizations, AMD formed a Joint Design Office (JDO) at Suresnes near Paris to work from May 1987 to the end of January 1988.

About 40 design and calculation engineers from seven European companies (AIT, AMD, AS, BAe, CASA, Dornier and MBB) here tried to lay common foundations for the future detailed definition of the work shares of the individual partners.

The work comprised a joint computer-aided design and calculation methods (CATIA, ELFINI), design guidelines and standards, the preparation for material selection, and the freezing of a technical basic definition. The selected materials mainly are fibre-reinforced resins of the latest technology (polyimides and bismaleinimides) while titanium is foremost among metal components. It would be welcome if this activity could be continued at a smaller scale into the development phase.

One of the greatest challenges are the fuel cells to be developed under Dornier leadership. They are to produce electrical power from hydrogen and oxygen. Such systems are already used by the US Space Shuttle, but as the Europeans want an autonomous development and the Americans protect their know-how from European competition, a simple takeover is practically excluded and, in any case, it is not the goal.

Similar systems are already operated in Western Europe—or on the ground. Siemens has some test installations in submarines, for example, and several companies are doing research work in this field (Varta, Elenco). But the operation in space (launching loads, microgravity, extreme reliability) is a problem which has yet to be solved. Dornier was entrusted with this task because of its vast experience with the inverse chemical process of high-temperature electrolysis (HOT ELLY) and with space research in general.

The primary goal, which must still be reached in 1988, is the selection of the optimum system from different basic possibilities. Until that stage is reached, the subcontractors will be competitors. It would be an ideal solution to unite all competing forces to solve this difficult but very future-oriented task without giving up the competition of ideas when the system decision has been made.

Hermes as a whole will be presented in many mockups and test models. The valid model philosophy comprises, apart from wind tunnel models:

- two development mockups (MA2 and 2)
- one cockpit development simulator (SDC)
- one static load cell (CES)
- one thermal structure model (MSTH)
- one system
- one identification model (MI)
- two flight models (FU 1 and 2).

A scale flight model as unmanned predecessor, called Maia after Hermes' mother in Greek mythology, is still under discussion, but its implementation is not sure. They first flight of FU1 will be unmanned in any case, and FU 2 is to make the first manned flight.

Time and Cost Planning

It has already been mentioned that the programme is in the predevelopment, or C1, phase when this article appears. This phase started on 1 April 1988 and it will end on 31 December 1990.

The essential milestones are:

- PDR* of the spacecraft system—mid 1989
- Final selection of critical technologies—mid 1989
- PDR of subsystems—mid 1989-mid 1990
- PDR of equipment—autumn 1990
- Proposals for phase C2—mid 1990

*PDR = Preliminary Design Review

The present planning provides the following milestones for phase C2, whose exact dates, of course, depend on the results of phase C1:

- Beginning of phase C2—January 1981
- CDR*—1993
- Start of subsonic flight tests—1996
- First flight, unmanned (FU 2)—June 1997
- Second flight, manned (FU 2)—May 1998

*CDR = Critical Design Review

The utilization phase of Hermes may start by 1999. Every flight unit is to have a lifetime of 15 years or 30 flights. Three flight missions per year appear feasible. The few dates related to Hermes proper also form the rough framework for the overall programme, the development success of which depends on a punctual and coordinated implementation. Details cannot be described here and neither can the costs. But to give at least an impression of the financial aspects, a few figures shall be presented which are based on ESA information. Until March 1988, the Hermes Preparatory Programme (HPP) had a budget of 130 MAU. (All figures correspond to prices of mid-1986, with conversion factors for 1987, which mens 1 MAU is about DM 2.15 million.)

The extent of the development programme at present is said to be around 4430 MAU, including phase C1 at 530 MAU. This includes all expenses from the costs for certain building constructions through capital costs to programme administration. Hermes development proper, including the ground segment or "reflux of capital into the industry", will cost about 3650 MAU.

Taking into account the German share in phase C1 of the total development and certain compensation arrangements with other participant nations besides the factor

for reflux of capital into the industry, the German industry can expect an order volume of nearly 1 billion accounting units (1000 MAU) or approximately DM 2 billion. Dornier will have a significant share in this.

Outlook

If the participating nations are to reach a positive decision on an uninterrupted continuation of the development programme in 1990, it is important that the four main objectives of phase C1 are reached:

1) Freezing of the system definition and especially the concepts for crew safety and the definition of mission requirements

2) Redction of technological risks to a reasonable dimension, mainly in aerodynamics

3) Definition of the information required for Columbus and Ariane

4) Ensurance of time and cost plannings.

In Greek mythology, Hermes is not only the messenger of the gods but also the dream god. He has already proven that he is the god of herds because there are herds—not necessarily of cattle but of people—at work under his name. May he also prove that he is the god of good luck.

/9274

Italy's Agusta Group Centralizes, Forms Alliance With Macchi

3698M389 Milan ITALIA OGGI in Italian 13 Apr 88 p 4

[Unattributed article: "Teti's Statement: Agusta Group, Alliance With Macchi"; first paragraph is ITALIA OGGI introduction]

[Text] Casina Costa (Varese)—The 24 companies are being merged. Sales exceed 1 trillion lire.

The 24 companies of the Agusta (Efim) group, operating in the three sectors of aeronautics, helicopters, and aerospace will merge into Agusta S.p.A. This was announced by President Raffaello Teti in a meeting with the press, on the occasion of which Teti revealed that negotiations with Macchi for commercial cooperation are underway.

This integration, which is intended to make the group more homogenous, started with the take-over and merger of Agusta Aerospace Systems into Aeronautical Constructions. This merger was approved a few days ago by Efim and is to be completed by October.

In a few years, all 24 companies, which will continue to market their products under their respective trademarks, are going to be absorbed by Agusta S.p.A.. The latter will therefore manage the 12 plants of the group, which currently has 9,718 employees and closed its books with a 30-billion-lire profit in 1987. As Teti explained, the helicopter division boasted an income of 60 billion lire, and the aerospace systems division broke even, while the aircraft division, which "is the most worrisome" reported a 28-billion-lire deficit. Overall sales slightly exceeded 1 trillion lire in 1987.

08606/08309

BIOTECHNOLOGY

Italy: Biotechnology Status, Future Examined

3698M309 Milan INDUSTRIA OGGI in Italian No 14, Mar-Apr 88 pp 50-52

[Interview with Alberto Valvassori, president of Assobiotec, by Daniele Colombo; date, place, and occasion not given]

[Excerpts] The United States, where the revolution of biotechnology was first started as a consequence of a series of scientific discoveries, now leads the way in this field.

Japan and, way behind, Great Britain, West Germany, and France, have been mere followers so far, spurred by massive public intervention to promote research and facilitate industrial applications.

In this sector, Italy lags well behind. The two extensive reports on the domestic industry of biotechnologies written so far by FAST (1983) and Federchimica (1986) both point to the urgent need for public and private initiatives in order not to lose the development opportunities made available by biotechnologies.

In October 1986, on the basis of the data provided by its survey, Federchimica set up Assobiotec, the National Association for the Development of Biotechnologies, open to all companies interested in the development of biotechnology products and of processes. At present, it has about 40 members, including the most important companies in the chemical, pharmaceutical and agrifood sectors.

Assobiotec intends to contribute to the development of a domestic biotechnology industry along four main lines:

1. Mechanisms for the definition of plans and financing for research and industrial development;
2. Procedural problems regarding authorization to offer products for public consumption and ecological environmental regulations;
3. Tax and financial policies to provide incentives for technological innovation;
4. EC intervention policies and procedures.

About one year after the creation of Assobiotec, we interviewed its president, Mr Alberto Valvassori, to draw an overall picture of the association's activities and to obtain an updated assessment of the situation of the Italian biotechnology industry.

INDUSTRIA OGGI: What has Assobiotec been doing during its first year of activity?

Alberto Valvassori: Our association contributed actively to the drawing up of the report discussed by the National Committee on Biotechnologies, which used it to prepare the National Research Plan for advanced Biotechnologies. The plan, adopted in May 1987 by the CIPI [Interministerial Committee for Industrial Planning] for a total of 400 billion lire, is divided into three main areas:

—medicine and veterinary medicine;

—chemistry, energy and environment;

—food and agriculture.

In July, a ministerial decree ordered the beginning of the first stage of the plan, under which 209 billion lire will be spent over five years.

At present, Assobiotec is carrying out a study on tax and financial concessions for biotechnology-related activities. By mid-1988, a paper will be ready for discussion at national level.

Education, too, a matter of primary importance in the development of the biotechnology industry, sees the involvement of Assobiotec through its participation in the National Committee for Biotechnologies, which was charged with preparing a paper on the issue.

The above activities prove that in Italy both Government and entrepreneurs have now become aware of the great opportunities provided by advanced biotechnologies and are taking steps along a promising path.

INDUSTRIA OGGI: How can the experience of more industrialized countries help Italy define its policies in the field of biotechnology?

Alberto Valvassori: Although we are still at an early stage of development, when we look at the experience of countries where biotechnologies have reached the most advanced levels we realize that success was primarily due to rapid exchange of knowledge between the academic and the entrepreneurial world, encouraged by a stimulating tax and financial environment. The lack of these incentives was felt in Italy. Assobiotec is committed to intervening at the crucial points of development in this field as revealed by the international comparisons carried out in Federchimica's study.

INDUSTRIA OGGI: If the experience of other countries is taken as a point of reference, is not Italy in danger of following a merely imitative path with all the risks involved?

Alberto Valvassori: The industry now develops in a global perspective, and it would accordingly be absurd to advocate totally independent development strategies. Biotechnologies are very flexible tools indeed and must be exploited as such, customizing them to each individual situation and problem. The Italian situation must be tackled in the awareness that the experience of other countries can certainly not be repeated as such and that the peculiarities of each environment must be considered and made use of. As happens in all hi-tech sectors, skills must be developed to bring to fruition in an original manner all the potentialities a technology may offer.

INDUSTRIA OGGI: You mentioned the relationship between industry and the research sector: what is the Italian industry faced with?"

Alberto Valvassori: An extremely close relationship with university research centers is essential for an internationally competitive industry, because biotechnology products, belonging basically to the sector of secondary fine chemistry, do have international markets which require very high standards. For cultural and institutional reasons, however, this type of relationship is difficult to establish in Italy. For example, the law that reorganized the situation of the teaching staff in universities led to a more cooperative structure. Greater openness toward cooperation with the industry would certainly be most welcome now. The industry definitely needs this cooperation, and if it fails to achieve it at home, it seeks it abroad, in countries with more advanced levels of research in biotechnologies. Significantly, some Italian companies like Montedison Enichem, and Fidia have entered into agreements with U.S. companies in this field.

INDUSTRIA OGGI: To what extent can the skills of some sectors of Italian industry, for example as regards fermentation processes, promote the development of activities linked to advanced biotechnologies?

Alberto Valvassori: Fermentation is an inevitable step when using advanced biotechnologies in industrial production. The knowledge of these microbiological processes is indeed a great asset of the Italian pharmaceutical industry. Therefore there does exist a pool of skills that, although insufficient by themselves, can be taken advantage of but must be enriched with the most recent scientific and technological advances. Downstream processes, on the other hand, pose enormous problems as regards product isolation, separation, and purification.

These stages require technologies which are either newly born or simply not there yet. The lack of specific skills in this regard is probably one of the most serious problems in industry.

INDUSTRIA OGGI: What could be the impact of advanced biotechnologies on the Italian economy?

Alberto Valvassori: For a series of reasons, advanced biotechnologies are now being developed primarily in the pharmaceutical industry; yet, all projections point to an extremely significant impact also on the chemical and agri-food sectors, whose trade balance deficits have been constantly growing over the past few years. In this wide range of potential applications, the Italian industry of advanced biotechnologies is extremely weak. In 1985, Italy only covered 20-30 percent of its domestic demand for advanced biotechnologies, put at around 100 billion lire, and that was entirely medicine and veterinary medicine, mainly for diagnostic purposes. The percentage share did not change in 1987, although demand grew to 150 billion lire. For the future, the national production of advanced biotechnologies will be very low. Indeed, unless something is done to develop and acquire new technologies, in 1992 Italy will only be able to supply 400-500 billion lire's worth of products, against a demand put at 500-600 billion lire in 1990 and 2,000 billion lire by 1995. Therefore, early measures need to be taken in order to seize the interesting growth opportunities provided by the domestic market alone.

INDUSTRIA OGGI: Human resources are essential in biotechnologies, just as in all other advanced technologies. In this regard, what is the Italian situation like?

Alberto Valvassori: It should be remembered that in the United States Italians make up the second largest foreign community of scientists involved in research on biotechnologies, which means that Italy does provide good educational training in this field. Despite existing infrastructure limitations, the background is very satisfactory indeed. The educational problem has long been debated in the academic world and within Assobiotec as well. Owing to the nature of the skills required, biotechnologists must combine their theoretical knowledge with practical experience. Accordingly, centers of excellence are required, either in industry, universities, or public bodies.

High level training is essential. Furthermore, the multidisciplinary nature of biotechnologies is not to be forgotten. Biotechnologists are certainly not asked to specialize in a whole series of disciplines, as this would lead to lack of specialization. However, each individual, specialized scientist must be able to cooperate with others in other sectors in order to carry out common projects. The time of isolated scientists, or of teams of isolated scientists, is over. Research in biotechnologies can only be done with constant exchange of information amongst the various research centers all over the world.

INDUSTRIA OGGI: What you have said so far shows that, although Italy is lagging behind other industrialized countries in the field of biotechnologies, some interesting initiatives are now being taken. How does the future look?

Alberto Valvassori: For a whole range of structural and short-term reasons which are difficult to list here, Italy started off late.

Initiatives taken in 1987 show growing awareness on the part of the public and private sectors regarding the opportunities provided by advanced biotechnologies.

In my opinion, these opportunities can still be seized.

However, no more time must be lost if we want the resources now being allocated to these activities to produce the expected results.

/12223

COMPUTERS

Achievements in Design, Use of Supercomputers in UK, France, Netherlands

UK, France Develop 'Supernode' in ESPRIT Project

3698a179 Paris SCIENCES & AVENIR in French Jan 88 pp 90-97

[Article by Dominique Commiot: "Supercomputers: Europe Bares Its Teeth"; first paragraph is SCIENCES & AVENIR introduction]

[Excerpts] Until now, the Americans and the Japanese have had a monopoly on "number crunchers" capable of handling billions of operations per second. Today the Europeans are contesting this supremacy with two challengers: Supernode, a product of the ESPRIT program, and Marie, a purely French product.

Will the supercomputer challenge be taken up? Without these number crunchers (as Americans colloquially call them), neither defense nor research nor industry can hold their own among world leaders. However, Europe was until recently totally absent from this field and still depends completely on two American manufacturers. Indeed, Cray Research and Control Data (today through its ETA Systems subsidiary) control almost 90 percent of the world market, even though three Japanese firms—Fujitsu, Hitachi, and NEC—have been competing with them for some years. Such dependence is dangerous in this sector of paramount strategic importance. Remember that in 1963 President Kennedy refused to authorize exportation to France of the then-fastest computer, which would have accelerated development of the H-bomb. General de Gaulle was furious and then decided to launch the famous "Plan Calcul" (computer plan).

Two recent events that went relatively unnoticed provide the beginning of a positive answer to the question we asked at the beginning of this article. At the International Show of Technologies of the Future (SITEF) in Toulouse in late September, Thomson CSF exhibited a prototype of Marie, the first building block in a French program funded essentially by the military. This machine, capable of handling up to 250 million floating-point operations per second (megaflops), falls into the supercomputer category. Eventually, a setup of 6 to 20 Maries linked together could provide a power of 1 to 6 billion operations per second (gigaflops). If this setup, dubbed Marianne, is achieved in good time, it could rival the most powerful American number crunchers. Marie's and Marianne's future has not yet been decided: Some uncertainty remains about funding future developments. Ongoing discussions between Thomson and three government sponsors—the Ministries of Defense, Industry, and Research—should conclude shortly. If the good fairies bend over the cradles of these two little girls, France will be in a position to attack the world market by the early 1990's with a supercomputer capable of outstripping foreign competitors.

The Supernode prototype's turn to make its first appearance came a week later in Brussels. This 400-megaflop European supercomputer, developed by British and French teams within the framework of ESPRIT [European Strategic Program for R&D in Information Technologies], costs one-tenth the price of conventional number crunchers of equal power.

In what respect are supercomputers strategic products? Certainly the machine which the French Military expected in 1963 was not strictly essential to produce an H-bomb. Both the Soviets and the Americans made their first bombs without supercomputers, but development required more than 100 life-sized tests, i.e., more than 100 open-air explosions. Simulators made possible by number crunchers allow us to keep tests to a minimum. Computing requirements are virtually infinite. Originally confined to military, then civilian government research centers, they are now appearing in large companies. In France, the EDF [French Electricity Company] and the CEA [Atomic Energy Commission], as well as Elf-Aquitaine and Peugeot, use supercomputers; hence the unbridled race for processing power. Consider that the Cray-1, which appeared in 1976, had a maximum speed of 100 megaflops and that today the ETA-10, produced by Control Data's subsidiary ETA Systems, has a theoretical power of 10 gigaflops! How are the European Supernode and the French Marie doing in this context? First of all, it should be noted that it took the EEC's ESPRIT program to finally initiate cooperation between European manufacturers. The Bull group had tried to join forces with Germany's Siemens to develop a supercomputer, but the German giant was not to be persuaded. The Supernode project, developed within the framework of the ESPRIT program, involves British and French participants only (see box). It is built around an exceptional microprocessor, the transputer, designed by the small English firm Inmos, a subsidiary of Thorn-EMI.

The transputer is exceptional in both power and organization. Its first version (T-414), created in 1983, knew only a limited success, particularly because of the complexity of its associated programming language, Occam. However, the performance of the new T-800 transputer model, mass production of which began last November, is such that this major inconvenience becomes a secondary consideration in the opinion of a growing number of computer manufacturers.

The T-800 is a single chip of 1 square cm which integrates the functions of both a conventional microprocessor and a chip dedicated to high-speed scientific calculation, the floating-point arithmetic coprocessor (see figure 1). The transputer's particular architecture, to which we will return, makes it 12 times as powerful as the most powerful Intel microprocessor, the 80386, associated with its arithmetic coprocessor, and 6 times as powerful as the Motorola 68020 under the same conditions. Even better, a single T-800 transputer has a higher theoretical power than Digital Equipment's VAX-8600 superminicomputer.

Its single chip integrates a 32-bit processor, 4,000 memory characters, and four communication links making possible interconnection of several transputers. At 20 MHz in clock speed, the T-800 handles 1.5 megaflops per second. In 1988, the T-800 could reach 30 MHz in clock speed and 2.25 megaflops in processing power.

The original feature of the Inmos transputer is that it allows the design of a multiprocessor system whose architecture can be modified by program according to the problems to be solved. Unlike conventional computers, which process instructions sequentially, a transputer network run by the Occam language processes the set of instructions leading to the solution of a problem simultaneously and in parallel. Transputer-based computers also differ from machines designed for parallel processing but whose architecture is fixed due to the organization of their components. Their architecture can be reconfigured by a program, according to the type of application. In other words, the corrections between the different processors, provided by the four high-flow (20 Mb/s) communication links of each transputer, can be redefined for each application and even during the processing of a program. The parallel-processing software, Occam, was developed by Inmos before the transputer, which was designed especially to run this language.

All these functions have been implemented in the Supernode program to produce a supercomputer capable of handling 400 megaflops in one of the current standard configurations. Its performance is not absolutely record-setting, but Supernode has a tremendous advantage: Its

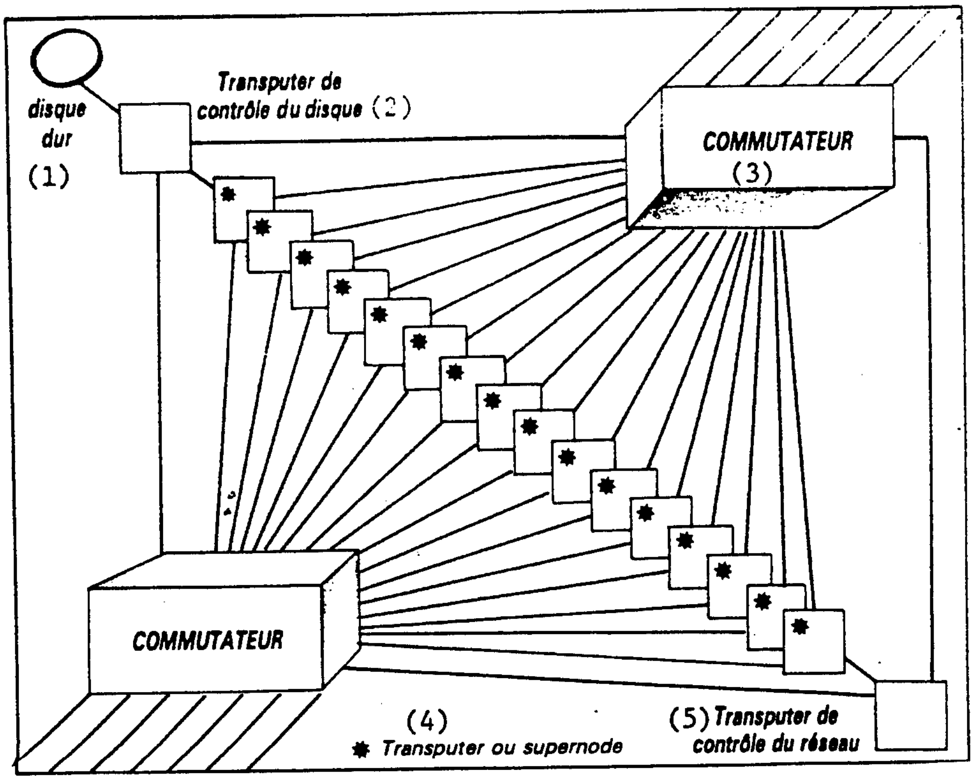

Figure 1. Supernode: A Sophisticated Construction Game

Key:—1. Hard disk—2. Disk-control transputer—3. Switch—4. Transputer or supernode—5. Network-control transputer.

A single Supernode combines 16 (or 32) transputers. These very powerful microprocessors have four communication links which make interconnection through a switch possible. They process different parts of the same problem simultaneously and in parallel. Interconnection of several Supernodes in a similarly arranged Reconfigurable Transputer Processor will produce 1 to 5 megaflops in power.

price should not exceed Fr 2.5 million, whereas a conventional supercomputer of comparable power currently costs 10 times as much. The project, launched in December 1985, should run for 3 years. The supercomputer, called Reconfigurable Transputer Processor (RTP), consists of a set of Supernodes. Each Supernode includes 16 or 32 T-800 transputers in charge of processing, interconnected in a programmable network. Each transputer's four communication links are connected to a switch arranged on two (or four) VLSI [very large-scale integrated] chips produced by NEC with a total capacity of 72x72 or 144x144 connections. This switch makes it possible to interconnect the different transputers, each of which has either a fast 256-Kb external memory or a mass memory (4 Mb) which, however, slows down performance. Two other transputers complete this setup: The first, equipped with a 16-Mb external memory, can store data and routes data and programs to be processed along the network. The second is optional and controls the hard disk which can be attached to the Supernode. This modular architecture makes it possible to envisage different levels of machines. A single Supernode constitutes a powerful individual workstation for an engineer. Equipped with a 4-million-character memory and a hard disk, it already offers a power of 16 or 32 megaflops, depending on whether it combines 16 or 32 transputers. The interconnection of several Supernodes in the RTP will provide a theoretical power which multiplies accordingly, depending on the number of transputers integrated in the system.

So much for theory. Where do we stand on practice? Two prototypes have been built (based on first-generation T-414 transputers) which are used for applications development. The first manufactured Supernode is to be delivered in December 1987, and the first machine combining several Supernodes should be completed in February. By then, Telmat, the French company in charge of making the prototypes, will deliver two machines with 128 T-800 transputers and one with 256 transputers. The three systems will be interconnected to carry out a series of tests and experiments. It should be

made clear, however, that the first T-800's delivered contained bugs (programming errors); but Inmos, their manufacturer, has developed autodiagnosis and bug-detection programs which have proven effective. Instead, it is the development of highly parallel software that produces major difficulties.

The Supernode computer makes sense only if its highly parallel architecture is used. Now, designing a highly parallel operating system and application software is a very delicate problem. Radically new program structures must be invented. The ESPRIT project also deals with the development of appropriate software for this very peculiar type of computer. Research involves software for scientific applications, digital signal processing and shape recognition, CAD (computer-assisted design) and CAM (computer-assisted manufacturing) applications on a single Supernode, and graphic software (image synthesis). Certain applications are already being run on Supernode prototypes. Admittedly, this is the Achilles' heel of the French-British program.

The less forward-looking French supercomputer program is based on more conventional architectures. Marianne seeks to reach 1 to 5 gigaflops in processing power, but is still far from that. Marie, whose prototype was presented for the first time in late September, is only the first building block for this project. Still, this machine capable of handling 250 megaflops per second, and the first model of the series should be available in 1989 or 1990.

Remember that this program, initiated in the very early 1980's and funded essentially by military appropriations, was to be completed, in principle, in 1987 or 1988. We are far from the target. Admittedly, delays are commonplace, in this type of development, but now the initial program, with an estimated cost of Fr 800 million, is being seriously questioned. The planned architecture includes a set of two to seven array processors called Isis. Array processors are machines which apply the same instruction simultaneously to a set of different data, the so-called array. The Isis processors were to be linked by an interconnecting network called Marianne to form the Marisis supercomputer. The Isis project was given to Bull, but taken away from this manufacturer in 1986 because of the prohibitive cost of developing the array processor. Two Isis prototypes were completed, however, one for the CEA and the other for internal development at Bull, but the product will not be industrialized. The Marianne network was assigned to SINTRA [Industrial Company for New Radioelectric Techniques and French Electronics], which later became CIMSA [Military Aerospace Data Processing Company-]/SINTRA, a Thomson CSF subsidiary. This company had in its files a supercomputer project, Marie, which was finally chosen to replace Isis. The future French supercomputer is now called Marianne. It should combine 16 to 20 Maries linked by a powerful interconnecting network to reach a power of 1 to 5 gigaflops. However, there is hardly any money left to fund future developments since the Isis program was so greedy for investments. An interministerial council should settle this thorny question in the next few weeks.

As a result, only a prototype of Marie was shown in Toulouse in late September. Its architecture has several essential advantages. It includes a maximum of 16 array processors interconnected by a high-flow network which shares a very large memory (a maximum of 128 million 64-bit words). These processors are arranged in a pipeline as are most large array computers. The pipeline consists of a series of processors which fit into each other. Each one is charged with processing a part of each instruction. In a conventional computer (microcomputers, for example), the processor performs the instructions one after another. Program instructions line up in a queue, as it were, before input. They wait until the preceding one is completely processed, which involves several phases. In a pipeline, however, the various processing stages are handled simultaneously at several specialized levels in the pipe. In other words, execution of an instruction can begin even before the preceding one has been entirely processed. Hence an increase in performance.

Like all supercomputers, Marie knows how to arrange data in arrays before processing them. It also has a very promising feature: After having arrayed all data that can take this form in the application, it identifies those parts which can be processed in parallel.

Marie's memory is organized in banks of 2, 4, or 8 million words and 4, 8, or 16 elementary processors can be interconnected in its internal network. This modularity makes it possible to configure Maries adapted to various types of requirements, with power varying from 1 to 4 and memory size from 1 to 16.

Let us also note that Marie is essentially based on widely accepted standards. Its input/output device is designed entirely using conventional components (based on Motorola 68020 microprocessors); its operating system, Unik V3, is widely used in scientific applications; and the programming language, Fortran 77, with its extensions for array processing (Fortran 8X), is the most widely used in this type of machine. This conformity to market standards will make it easier to introduce Marie. A big unknown, however, is the price at which this machine could be marketed. If all goes well and Marie is launched in 1989 its performance risks seem modest in the face of the bustling market in the United States for "crayettes," as these supercomputers are derisively called, which are two to four times less powerful than the big Crays but 10 times less expensive. Even better, Control Data's specialized subsidiary, ETA Systems, has just started marketing two compact supercomputers that are much easier to set up and use (they are the first supercomputers which do not even need an air-conditioned environment, but still very fast and, above all, very cheap for this class of

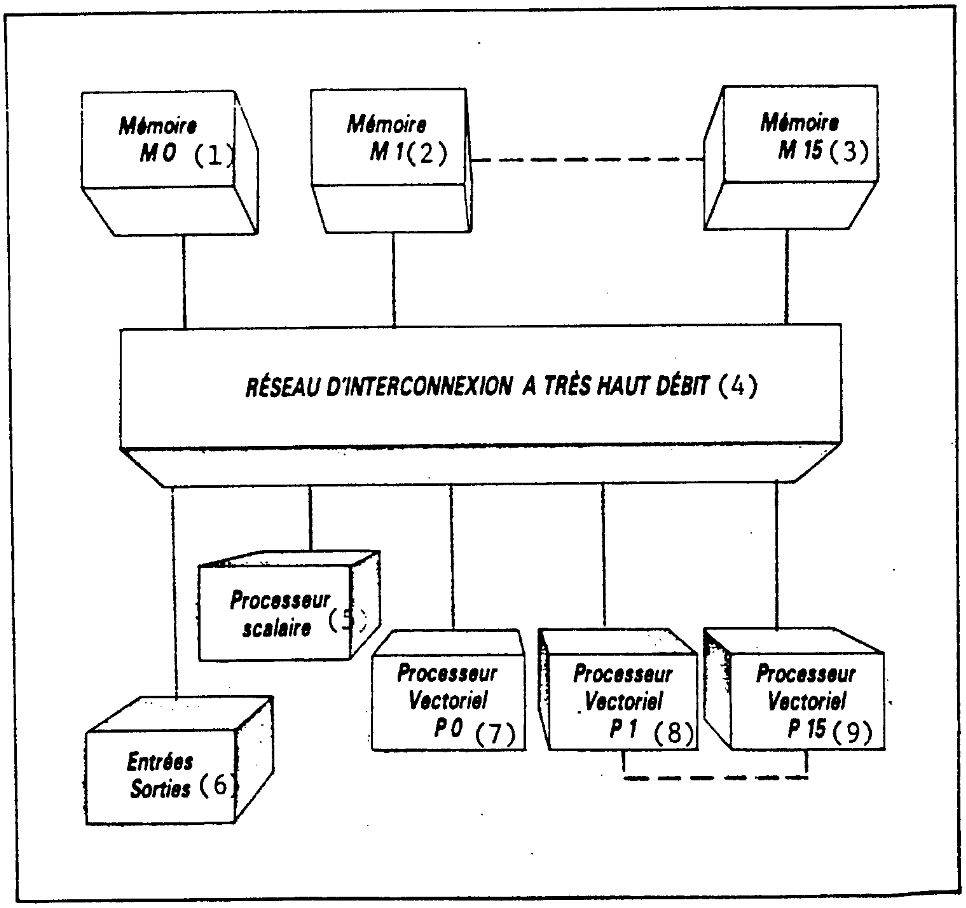

Figure 2. Marie, The First French Supercomputer

Key:—1. Memory M0—2. Memory M1—3. Memory M15—4. Very-high-flow interconnecting network—5. Scalar processor—6. Input/output—7. Array processor P0—8. Array processor P1—9. Array Processor P15

Marie combines up to 16 array processors interconnected by a high-flow network and working in parallel to process one and the same application. This architecture gives Marie a power of 250 megaflops per second. The integration of 16 to 20 Maries in Marianne will make it possible to reach several gigaflops per second.

equipment. The ETA-10, models P and Q, have a power of 375 and 474 megaflops, respectively, and cost $800,000 and $1.2 million....

Was it necessary to launch development projects costing several hundred million francs despite the very real risk of always being outdistanced by American and Japanese competition? Yes, replied the French Military, very concerned about national independence. Yes, replied the European Community, too, which has been able to rally scattered forces through the ESPRIT program. The ongoing projects deserve credit at least for considerably increasing concrete experience in supercomputer architectures, in which Europe was so bitterly lacking. Let us bet that the government sponsors will continue the effort to which they are committed. Only by pursuing this adventure will the Old Continent finally—but when?—stand up to its great rivals in a strategic domain, and also in a constantly growing market.

[Box, p 97]

Supernode Partners

The ESPRIT program for the European Supernode supercomputer was launched in December 1985. It represents an investment of 11 million ECU's (approximately Fr 70 million) over 3 years, financed (50-50) by the European Community and by seven partner companies, five of which are British and three French.

The Royal Signals and Radar Establishment (RSRE), the prime contractor, manages the project. It has also defined the switching circuits and is developing signal processing applications.

APSIS [not further identified], which is housed at Meylan near Grenoble, is developing the engineering workstation consisting of a single Supernode and an accelerator for simulating VLSI circuits in computer-assisted

design. Finally, APSIS is working on a Supernode machine capable of handling CAM applications in an industrial environment.

The British firm Inmos, a Thorn-EMI subsidiary, is responsible for designing and producing the transputers. It is also developing diagnostic and debugging software for the Supernode.

The IMAG [Information Sciences and Applied Mathematics of Grenoble] computer engineering laboratory (University of Grenoble) is studying possibilities for languages of a level higher than Occam (the basic language developed by the Inmos) to run the Supernode's parallel architecture while reducing programming difficulties.

The University of Southampton has studied ways to connect a large number of transputers in flexible and modular fashion and created the first Supernode prototype. It is also developing broad scientific applications and is responsible for low-level systems software.

Telmat, located at Soultz near Strasbourg, is responsible for developing and producing the first prototype of the Reconfigurable Transputer Processor (RTP) associating several Supernodes; it is also conducting research on image sythesis applications.

Lastly, Thorn-Emi designed the autodiagnostic software and worked with the University of Southampton to manufacture the first prototype. It is also developing signal-processing applications.

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Netherlands Supercomputer Project Funded

3698a236 Zoetermeer SCIENCE POLICY IN THE NETHERLANDS in English Apr 88 pp 3-4

[Article by Theo Potma: "Forces Joined in Supercomputer Project" and subheaded "ISNaS—Gases and Liquids No Longer Vanish Into Thin Air"]

[Excerpts] This year the Dutch government has provided funds (2.5 million guilders from the Ministry of Education and Science and 2 million from the Ministry of Transport and Public Works) to set up the ISNaS project, which stands for Information system for the Simulation of currents based on the Navier-Stokes equations. The project is a unique cooperative venture involving various technological research institutes and two universities of technology. This is essentially a matter of pure fundamental research but the possibilities for application could be spectacular. In a few years time the shipping and aviation industries in the Netherlands as well as many others will be able to use very advanced tools for designing.

Viscosities

Prof J. Zandbergen of the Applied Mathematics Department at Twente University of Technology and leader of the ISNaS project gives a simple explanation for a complicated subject: "We are concerned with currents, for example in the air around an aircraft or in the water around the legs of an oil rig. The Navier-Stokes equations are very complicated and cannot be solved using conventional numerical methods, even with the progress that has been made with numerical techniques since the early 1950s. In order to calculate the features of currents somehow, you just have to ignore various effects. This applies in particular to the viscosities that occur in liquids and air. It may sound odd but we can talk about viscosity in air. Thin layers of air become attached to the edges of an object, for example an aircraft fuselage. We call these transitional layers and that is where viscosity takes effect. You have to take it into account if you want to show air movements around an aircraft but you get nowhere with numerical methods. So viscosity is often ignored to start with.

"Approximations, the transitional layer methods, are then used to consider the viscosity separately and the results are then incorporated in the final calculations.

"But there are situations in which these approximations cannot be used at all. The transitional layers may lift off and give rise to complicated patterns of turbulence. There are also problems if you have wide transitional layers. And then it is necessary to solve the Navier-Stokes equations in full as they originally included terms for viscosity."

Turbulence

"Things are often far more complicated in practice; if currents are not formed in layers, without a nice regular structure, you get a behaviour dependent on time, namely turbulence. We are still a long way from working out turbulent currents and we can only approximate on the basis of experience. There are now many turbulence models based on empirical data. They are vitally important in solving practical problems but as yet there is no universal turbulence model. It is a question of controlling the time-dependent effects and what we actually do is to average out the time—we assume a value of zero for the average time in all turbulent parts of the current. If we apply this averaging process to the Navier-Stokes equations we get the Reynolds averaged Navier-Stokes equations, which contain all the original terms but with reference to the main current only."

Put simply, the scientists' problem is that they cannot do their sums and they have to work with models of the situation knowing that they do not include all the details of what is actually happening. The aim of ISNaS is to make major progress towards solving the sums but this will require the utmost from what computer technology can offer.

"To give an idea of the problems, let's take an aeroplane," says Prof Zandbergen. "Suppose that we have to work out the nature of the currents at 100 different places (which is not all that many) in the air flow around an aircraft. This is 100 places, each with three dimensions. This gives one million items to be calculated by the computer and this becomes five million for the characteristics of five orders of magnitude. All that has to be calculated and produced as a package that can be used in applications. This tends to mean a three-dimensional representation, which is virtually impossible to do on paper. You need to use graphics. Designers interested in the equipment produced by ISNaS will mainly be using pictures. For example, if they want to work out the effect of a small alteration in the design on the currents, a diagram on a VDU should show this, preferably as quickly as possible."

Cooperation

However, a good deal of hardware and software needs to be developed before one can think of graphic representation of models. The software needed to cope with the Navier-Stokes equations is probably among the most advanced to be developed in the Netherlands, which is so complicated in fact that the main technological research institutes in the country and two universities of technology have put their learned heads together to get the project off the ground. ISNaS is a unique cooperative venture involving the National Aerospace Laboratory (NLR), the Hydraulics Laboratory (WL), the Netherlands Maritime Research Institute (MARIN), the Netherlands Energy Research Foundation (ECN) and the universities of technology of Delft and Twente. The plan will receive 2.5 million from the Ministry of Education and Science and 2 million from the Ministry of Transport and Public Works and is to be implemented over five years. A total of 20 million guilders was originally planned but this has had to be virtually halved as the Ministry of Economic Affairs was unable to make its contribution as planned for budgetary reasons. The fact that the research institutes themselves will fund half the project shows how important they find it. MARIN and ECN at first withdrew from the project when the Economics Ministry did not supply funds, but they are new taking part at their own request and at their own expense. The Mathematics and Information Science Centre (CWI) is also taking part as a subcontractor for the NLR.

The cut in budget has meant that the VDU presentation mentioned above has been dropped.

Supercomputer

At the NLR Mr W. Loeve (the head of the Information Science Department) and Ms M.E.S. Schuurmans (their ISNaS project leader) stress the practical nature of the research results: "We are doing computer-aided engineering and we want to develop equipment for industry. We are talking about designing the shape of products, for instance cars and aircraft, and the allied characteristics. Shape and characteristics have a great effect on each other. In order to find out as much as possible at the design stage you can do tests in wind tunnels but they are getting more and more expensive to build; it is also time-consuming and there are other disadvantages. For example there is the effect of the walls, which would not normally be there in practice, and the measuring instruments often distort the airflow. As an alternative you can use computer simulations. Digital simulation uses mathematical models to describe physical reality. Simulation models have their porblems too; it is often too complicated to reproduce all the details and exceptions properly. But wind tunnels and computer models can complement each other."

"The arrival of ever-faster supercomputers means that there will be much greater scope for simulation models," said Mr Loeve and Ms Schuurmans. "Efficient computer simulations will enable us to calculate modifications very quickly. One advantage of such models is that many effects can be put in and taken out again easily. However, sooner or later the results must be tested for accuracy. And then we need the wind tunnel." A crucial factor will be determining the practical applicability of the software to be developed. That is easier said than done as it involves very complicated problems requiring the combined efforts of very many people from different disciplines. However, Mr Loeve and Ms Schuurmans regard this as a challenge. "It forces us to develop the right methods. We have to do so because the competitors of our potential users are working on such systems elsewhere in the world. The fact that we are working with so many different partners makes our approach fairly unique but at the same time more complicated. But that is the strength of the Dutch approach—we are combining expertise enabling applications in various areas. We are able to work on this as supercomputers are getting increasingly bigger and faster. We wouldn't even start without such computers."

They noted, not without pride, that the most powerful computer in the world, the NEC SX 2, will start work at the NLR in a few months. The research into currents played an important role in the acquisition. The arrival of this giant (and a good many other computers with by no means modest capacities will also be used) will enable future users, such as ship and aircraft builders and civil engineers, to make use of the new Navier-Stokes equipment, although not immediately.

Future

Mr Loeve explained, "We are concentrating on the user, but it is pretty fundamental research and it is so complex that the design will take a long time. Private industry will not embark on such projects readily as they involve heavy and long-term investments. The results will not be available for a long time. Fokker has other things to deal with at the moment. But this research must be done; otherwise, a large section of Dutch industry will find

itself empty-handed after a number of years. The government recognises this. We are developing equipment of the future. We are actually gearing the development of our methods to supercomputers that do not exist yet. For example if there are certain calculations that should not take more than half an hour for practical reasons and our new supercomputer takes four hours to do them, we will bear in mind that in a few years there will be a supercomputer that will be able to do them in half an hour. You need to be ahead of developments. The NLR has some experience in developing large software systems for various users. We have developed our own procedures and we are making use of them for ISNaS. But the project has its own requirements and the support we have had from the government as part of the IT Promotion Plan is intended to enable us to gain experience in the development of this type of large and extremely complex software system."

Overview of Sites, Uses of Supercomputers in France

36980302 Paris L'USINE NOUVELLE in French 19 May 88 pp 62-63

[Article by Thierry Lucas: "Industry's Super-Computations"]

[Excerpts]

Applications in Aerospace, Autos

Supercomputers are proliferating in the aeronautical, nuclear, oil and automobile industries. As computing needs keep increasing, today's top-of-the line machine will become tomorrow's indispensable tool.

Over 1 billion operations per second (gigaflops) on the Cray-2 installed at Polytechnique; three times as many on the Control Data Eta-10 supercomputer ordered by the British weather bureau.... These impressive figures are, for the time being, computing speed records. The race goes on and we are promised performance figures 100 times greater.... Yet, although its computing needs keep increasing, weather forecasting accounts for only 4 percent of all users of computers from Cray, the manufacturer with a 60-percent share of the market.

But the most remarkable phenomena in recent years has been the proliferation of supercomputers in sectors such as the aeronautical, nuclear, oil and automobile industries. Indeed, these industries now find it necessary to invest in computers with relatively "modest" performance figures (a few hundreds of megaflops) but with prices still in the tens of millions of francs.

Thus, the aircraft division of Aerospatiale just installed a Cray X-MP—a Fr25-million investment—at its Toulouse engineering and design department. With a computing power of 100 megaflops, it is used for structural and aerodynamic analyses. Actually, Aerospatiale has already 3 years of experience in computing with the Cray of Onera [National Office for Aerospace Studies and Research] in Chatillon. "We were sharing the computer with other partners (Matra [Mechanics, Aviation and Traction Company], Snecma [National Company for Aircraft Engine Study and Manufacture], Turbomeca, etc.)," Robert Le Reun, head of scientific operations, explained. "Our utilization rate was strongly increasing, which prompted us to acquire our own machine. In addition, large volumes of data had to be transferred between Toulouse and Chatillon. We now get results a lot faster, which makes it possible to perform certain computations systematically and to reduce engineering and design cycles." Nearly the whole aerospace industry is now equipped with supercomputers, from Boeing and McDonnell Douglas to Saab [Swedish Aircraft Company] and Casa [Spanish Aeronautical Engineering Company].

In the automotive sector, Ford and General Motors are among Cray's clients, along with the Japanese Nissan and Honda. As for Europe, it does not lag behind since Opel, Volkswagen, Daimler-Benz, BMW and Peugeot are now developing car models on their own supercomputers. For these manufacturers, the acquisition of such a machine resulted in a veritable leap in their available computing capacity, making it possible in particular to optimize combustion phenomena (modeled in three dimensions) and to simulate the effects of a vehicle crashing against an obstacle.

In France, Peugeot was just followed by Michelin which also chose a Cray X-MP for its Ladoux research and development center. Because of the diversity of tire constituents and the non-linear behavior of tire materials, tires are a complex product which is very hard to model. As a result, the development of a new tire, to meet ever more precise requirements, involves the resolution of tens of thousands of non-linear equations the results of which will make it possible to reach the best solution rapidly, without requiring a series of useless prototypes.

On a very different scale, geological exploration produces huge volumes of seismic data which must be processed to locate oil and gas deposits. Some 20 oil companies, including Elf-Aquitaine and the French Petroleum Institute (IFP) now possess Cray X-MP supercomputers which are also used to simulate the behavior of subsoil reservoirs in order to determine the best operating conditions.

At Total-CFP [French Oil Company], the 375-megaflop Eta 10-P ordered from Control Data will multiply tenfold the computing capacity available to "reservoir" engineers. Some 30 engineers will be connected to the Eta-10 through workstations. As far as exploration is concerned, Total is processing seismic data on the Crays of the General Geophysics Company, "because the volume of data to be processed does not warrant such an investment," Michel Elle, head of data-processing coordination at Total Exploration Production, explained.

This pragmatic attitude is also that of all large industrial groups, although they are well aware that the demand for computing power will keep increasing. In view of the development of simulation techniques, machines with a 10-gigaflop capacity will probably be required in 5 to 10 years.

In the meantime, an increasing number of manufacturers are interested in intensive digital computing, but most of them do not have tens of millions of francs to invest. This market, simmering with excitement, is that of the "Crayettes," with computing powers ranging from 20 to 100 megaflops. "The SCS-40 from Scientific Computer gives us one third the power of a Cray X-MP for one tenth of its price," explained Etienne Jankovich, head of scientific information at Hutchinson. The industrial rubber manufacturer uses intensive computing to study the behavior of complex parts (in particular for the defense market) or stresses existing at the metal-rubber interface. "The current configuration will probably be saturated in two years from now," Etienne Jankovich pointed out. "We will then have to install several parallel processors, or trade in for a more rapid processor which SCS may have developed in the meantime."

Total also uses one of these "Crayettes" which are flooding the industrial market. That one is a Convex C-210 (50 megaflops) used for geophysical research. The goal is to develop and test simulation models used in the subsoil exploration stage. "Until 1987, we used outside computers," Michel Elle told us, "and data-processing costs were putting a strain on our research. The emergence of the 'Crayettes' enabled us to have our machine, with a reasonable operating cost."

Same trend can be observed at Bertin, a research contractor with sales amounting to Fr300 million, mostly from studies in mechanics and thermics. A user of the Onera Cray, Bertin just acquired a Convex C-210 which should cover most of its computing needs. Some 60 engineers will use the Convex; there should be twice as many in two years from now. By then, more powerful computers will certainly be required.

Alliant, another "mini-supercomputer" manufacturer which just opened a subsidiary in France, recently introduced a new generation of machines. For a price of Fr1-3 million, these systems will integrate up to eight processors in the maximum configuration, offering 180 megaflops of computing power. In France, SNCF [French National Railroads] has acquired some for structural computations. Some of the other European clients of Alliant are the chemical company Bayer which uses this hardware for a computerized simulation of molecular activity. This application is still relatively rare, but it represents a new market for supercomputers, including the larger Cray-type machines. "The chemical world will come to our computers as soon as we can prove that they are profitable," Robert Levy, chief executive officer of Cray France, explained.

This penetration strategy does not prevent the world leader from pursuing the development of superpowerful machines, at prices that are still mostly prohibitive, as it is clear that, tomorrow, these computers will become indispensable tools for large manufacturers.

Locations of Cray Supercomputers

36980302 Paris L'USINE NOUVELLE in French 19 May 88 p 21

[Article by Jean-Pierre Jolivet: "Your Local Cray"]

[Text] Capable of completing huge computations in record time, supercomputers are being set up in France.

Initially used by large research laboratories, supercomputers are now finding new applications. Close to 40 percent of Cray Research sales are to the private sector: in the aeronautical industry (to simulate the behavior of aircraft in flight), the automobile industry (computer-aided design, accident simulation, research on engine combustion), and the chemical industry (simulation of very complex molecules).

The electronic industry is also interested in them, to design VLIS [very-large-scale integration] integrated circuits.

We should also mention the movie industry which is beginning to use supercomputers to generate synthetic images and special effects.

Supercomputer prices are still high, Fr20-120 million.

Hence the idea for some users to associate themselves; for instance, the economic interest group CCVR [Center for Vector Calculus for Research], which consists of some 10 research laboratories and uses the Cray-2 of Polytechnique in Palaiseau. Or again, Onera's idea: it rents its Chatillon supercomputer to a small circle of users. "Service bureaus" might emerge tomorrow. Because, as Robert Levy, chief executive officer of Cray France, told us, "it is always possible for a researcher to get connected to a supercomputer."

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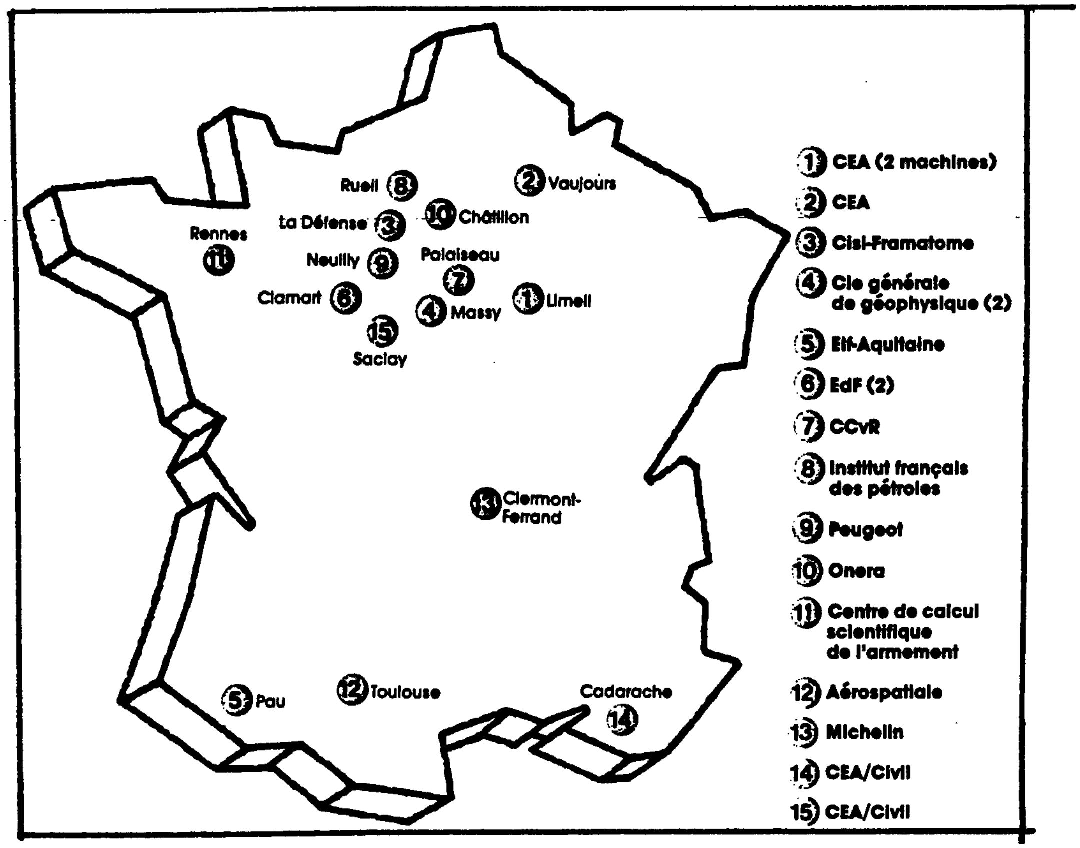

The 18 Cray Research Supercomputers Installed in France in 1988

Key:

1	French Atomic Energy Commission (2 machines)
2	French Atomic Energy Commission
3	International Company for Data-Processing Services/Franco-American Atomic Construction Company
4	General Geophysics Company (2)
5	Elf-Aquitaine
6	French Electricity Company
7	Center for Vector Calculus for Research
8	French Petroleum Institute
9	Peugeot
10	National Office for Aerospace Studies and Research
11	Directorate of Armament—Scientific Computing Center
12	Aerospatiale
13	Michelin
14	French Atomic Energy Commission/Civil
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European CD/ROM Market Analyzed

369a204Amsterdam COMPUTABLE in Dutch 18 Mar 88 p 16

[Article by Vincent Vreeken: "Europeans Still Do Not Believe in CD/ROM"; first paragraph is COMPUTABLE introduction]

[Text] London—By 1992, only an estimated 284,000 CD/ROM drives will be in use in Europe. "Only," because in that same year, about 30 million personal computers will be in use. This rather somber outlook is offered by the "CD/ROM in Europe, 1987-1992" report, which was put together by the Link Resources marketing agency, a subsidiary of the famous International Data Corporation.

In comparison with the United States, most European information producers are rather reserved, says the marketing agency: Thus far there are just about 40 European CD/ROM products available. Italy stands head and shoulders above other Europeans in the use of this new storage medium: In Italy, 4,020 CD/ROM drives were in use last year. The FRG and the UK are second, with 720 of these advanced peripherals each. In all of West Europe, last year's total amounted to 6,700.

Gradual Introduction

A major reason for the reticence of European publishers and information producers is the fact that CD/ROM applications introduction could lead to a loss in returns from other types of publication. The lion's share of products comes from relatively small publishers, who do not consider CD/ROM to be a threat to their existing products.

At the moment, it is still too early to predict which way the market will go. However, according to market research, the market will develop gradually. This means that information users will gradually gain confidence in the new medium. Consequently, products will mainly have a professional and vertically aimed character in the years to come.

Saturated

The European information market will not be saturated in the next 5 years. The same holds true for CD/ROM, says Link Resources. Still, CD/ROM sales will not be booming until next year. For this year, Italy remains ahead with 13,800 CD/ROM drives installed. The FRG follows in second place with 2,950 drives and the UK comes in third with 2,400 drives.

The top five will not change until 1992. According to rough estimates, the FRG will then be leading in CD/ROM applications, with 61,000 drives. The UK will follow with 54,000 drives, and France will come in third with 45,500. Italy will remain first in 1991 but slow down by 1992, when it will have no more than 45,000 drives installed.

25063

MICROELECTRONICS

France Criticizes, Makes Proposal Concerning Dutch-FRG JESSI Project

SGS-Thomson Executive Comments

3698a215 Groot-Bijgaarden DE STANDAARD in Dutch 7 Apr 88 p 14

[Article: "Dispute Over European Chip Project"]

[Text] Munich (Reuter)—In an interview with West German journalists, Philippe Geyres, vice president of SGS-Thomson Microelectronics, declared that the future of a $2.5-billion European project for the development and production of semiconductors (chips) could be threatened because of a dispute over different companies' participation.

Geyres is worried that the West German Siemens group and the Netherlands Philips concern may reduce his French-Italian company's role in the project. "Europe must cooperate to compete with Japan and the United States, but we want an equal share in the project," he declared.

Along with Thomson, this project, dubbed Joint European Semiconductor Silicon (JESSI), also involves Siemens, Philips, the British Plessey electronics group, and the Netherlands and West German ministries of research.

From the beginning SGS-Thomson was involved in the preparatory talks on JESSI, which began a little more than a year ago, according to Geyres. The project directed at the design and development of a 16- to 64-megabit chip, will run for 8 years and should begin next year.

"I was most surprised to read in interviews with Philips and Siemens that, in their opinion, cooperation with SGS-Thomson would not be possible, or that we would only play a minor role," said Geyres.

Second

SGS-Thomson was created in June 1987 following the merger between the semiconductor activities of the French Thomson-CSF group and the Italian STET [Turin Telephone Company]. According to Geyres, it is Europe's second largest semiconductor supplier after Philips.

In his view, the dispute apparently resulted from a misconception about SGS-Thomson's intentions and the incorrect impression that the company was no longer interested in JESSI.

Industrial circles say that SGS-Thomson was very busy restructuring last year and may have given the impression of having no time available for the European project. A Philips spokesman has declared that his company is not trying to ban other companies from the JESSI project.

Vice president Geyres said that SGS-Thomson is attempting clarification through talks with both Siemens and Philips. SGS-Thomson however will not accept a minor role in JESSI.

"There can be no first- and second-rate companies in this project," he declared. SGS-Thomson especially wants an equal share in the process technology, which includes fabrication of silicon wafers (containing the chips). "Process technology is the project's principal part. We either participate in it or we will not participate at all."

If only Siemens and Philips participate in the JESSI program, it will not be able to compete with the United States and Japan, according to Geyres. Companies like the Japanese Toshiba invest up to $400 million a year in semiconductor technology research, an amount which can hardly be met by individual European companies.

Last year, SGS-Thomson had a $860-million turnover resulting in net losses, not clearly specified.

25063

SGS-Thomson Makes Proposals Concerning Participation

36980304b Paris ELECTRONIQUE ACTUALITES in French 15 Apr 88 p 17

[Article by D. Girault: "STM Proposals for Fair Cooperation in JESSI"]

[Text] Establishment of the JESSI [Joint European Semiconductor Silicon] program will definitely encounter a lot of difficulties. The battle has been openly engaged in after the usual heated exchanges that the press has peddled. It fell to Mr Philippe Geyres, director of planning and vice president of SGS-Thomson Microelectronics, to preach the good word in West Germany. According to him, there is no question of leaving to the "Siemens/Philips duo" control over research in microelectronics under the EUREKA banner. The terms of this program call for acquiring European knowhow in producing circuits of line width of 0.3 to 0.5 microns. This program will be supported by $2.5 billion invested over 8 years, so that the results will be in effect in 1995. The development tool is a memory of 64 megabits.

In the view of Philippe Geyres, two levels of cooperation might be foreseeable. Research would be divided equitably among the four European "big powers": initially, it would be a matter of developing the procedures for photolithography, testing, etc. Then, during the industrialization phase, each company would return to its specialization, that is, for STM it would be EPROM, for Philips DRAM and SRAM, for Siemens DRAM, and for Plessey dedicated memories. However, even on this level, "encroachments" are in evidence, since STM, through its U.S. center in Dallas (Mostek), is working more and more on dedicated memories, while Philips and Siemens are working together, in the context of the "Megaproject," on 4-megabit DRAM memories (without mentioning Toshiba's unofficial participation in development of the 1-megabit DRAM memory of Siemens).

At any rate, according to Mr Geyres, each of the participating companies could obtain from the other three the products that it does not manufacture.

The crusade conducted by Mr Geyres, speaking in the name of STM, disarmed the Siemens/Philips movement to downgrade it. Remember that the two entities, Thomson and SGS, became involved in the EPROM 4 and 16 megabits development at the outset under the EUREKA cover, and that after their merger (in May 1987), they reaffirmed their intention to participate in JESSI in an official letter on 5 November 1987.

Mr Geyres proposed a balanced cooperation, meaning sharing of tasks, since STM did not intend to settle for being supplier of equipment expected to be needed for the French-Italian group, Philips and Siemens. Moreover, and the argument has substance because it is money that is involved, it is normal for work to be divided equally since the money to carry out the program will come in part from the assistance of the governments of the Netherlands, the FRG and France. It is thus not a matter of Philips and Siemens doing the work using EUREKA funds. In any case, a meeting of the JESSI participating countries has been arranged for the end of this month to settle the problem.

It will thus be difficult to achieve the Europe of the components, since the confidence has yet to be established.

The JESSI project, if it exists, could be delayed, since it has to be finalized by the end of this year, at the latest.

Moreover, it is not a matter of the STM and Mr Lacour, director of LETI and the consortium official in charge of negotiating the French participation in JESSI, establishing new structures (in the Netherlands and the FRG), but rather of using those already existing.

9920

Advances in Integrated Circuit Production Equipment in France

CNRS Develops New X-Ray Source for Microlithography

36980303 Paris ELECTRONIQUE ACTUALITES in French 22 Apr 88 p 15

[Article by S. Dumontet: "Developed by the CNRS [National Center for Scientific Research: An X-Ray Machine That Opens the Way to High-Output X-Ray Lithography"]

[Text] The LULI laboratory of the CNRS has developed an X-ray machine that opens the way to X-ray microlithography with outputs comparable to those of optical systems. Until now, X-ray microlithography research used either synchrotron sources which, as is known, are expensive and bulky, or traditional sources with the drawback of rather low power outputs, leading to rather long resin exposure times and therefore rather low wafer outputs.

As a by-product of its laser fusion research, the LULI laboratory demonstrated that specific laser types would create plasmas that would emit X-rays in a wavelength range (10 angstroms) suitable for microlithography. Mr Labro of the LULI explained that the laboratory also determined the specifications of an average-output laser which would make it possible for a lithographic process to achieve the same wafer output rates as those of optical photorepeaters. It would be a pulsed laser with an average power output of 100 watts and a high repetition rate (100 Hz). Each laser firing should provide a few joules of energy lasting a few nanoseconds. Current lasers could not reach a repetition rate of 100 Hz but would not be far from it. Mr Labro believes that this would be feasible in a few years. Already, the LULI laboratory has completed lithography experiments and achieved experimentally feature sizes of less than 0.3 microns.

A 10-Joule Source

The LULI laboratory is working with high-power lasers, of the neodymium-glass pulsed type. These are focused on targets in order to achieve thermonuclear fusions. Metallic targets can thus be heated to millions of degrees. An X-ray emitting plasma is then formed. Mr Labro explained that 30-50 percent of the laser energy is then converted to X-rays (the percentage will depend on the X-ray range). In the 10-angstrom wavelength range, the percentage is 10 percent of the laser energy output. To obtain a 10-joule source, therefore, a 100-joule laser is required. According to Mr Labro, applications of this type might require a power laser of the order of Fr1 to 2 million.

The CNRS may not be the only one to have discovered this new type of X-ray source. According to Mr Labro, a Japanese laboratory engaged in fusion research (the ILE of Osaka) reached the same conclusions. A U.S. company, Hampshire, is also said to be working on the process, but did not disclose how far it had progressed.

Having completed its research, the LULI laboratory contacted companies likely to be interested. In particular in France: Microcontrole (a manufacturer of photorepeaters) and Nanomask (a manufacturer of masks for the semiconductor industry) as well as Thomson, which is working on X-ray lithography (at the Corbeville Research Center) under and ESPRIT project. The only interested party, it seems, was the U.S. company Micronix, specialized in the production of X-ray steppers—it used traditional sources in its models—and a pioneer in this field. But Micronix was in financial trouble and had to close down. The process is therefore still waiting for a manufacturer to get interested.

Mr Labro indicated that this new type of X-ray source could also be used for other applications, in imagery or in instruments.

New Molecular Beam Epitaxy Equipment at Riber

36980303 Paris ELECTRONIQUE ACTUALITES in French 29 Apr 88 p 13

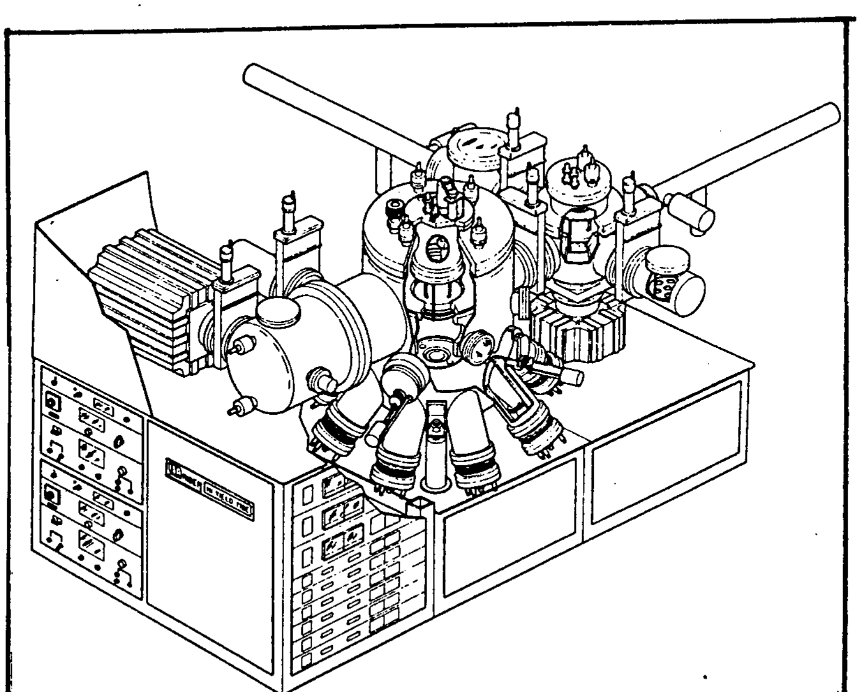
[Article by S. Dumontet: "Riber Increased its Sales of Molecular Beam Epitaxy Systems by 66 Percent in 1987"]

[Text] Riber, the world leader on the market of molecular beam epitaxy (MBE) machines announced that its sales of MBE systems rose by 66 percent in 1987 (compared with 1986); it sold 40 machines in 1987, and only 25 in 1986. The unit selling price of these machines is in the Fr3-8 million range, depending on the number of modules included. This increase in the number of sales resulted in a 30 percent increase in the company's sales volume. To meet the demand, it just opened a subsidiary, France Ultra-Vide, in Maule (in the Yvelines department); it will produce mechanical parts used under ultra-high vacuum conditions. Actually, the company, which has no room left to expand its Rueil Malmaison facilities, will regroup in the new premises all mechanical activities that can be decentralized. At Rueil, 200 m^2 of clean rooms have just been added, bringing the total area to 1000 m^2. That is because MBE machines are manufactured in clean rooms, due to the cleanliness requirements of systems for which the company guarantees a maximum vacuum of better than $4x10^{-11}$ torr.

For the Deposition of Superconductors

MBE machines are used especially for the epitaxy of III-V GaAs and GaAlAs compounds. This market is growing, especially in Japan for the manufacture of III-V optocomponents, and in the United States where there are large military programs. Riber, which claims that it has installed 180 machines, saw its sales increase in 1987, in Europe and in the United States. It now has 66 machines installed in the United States, 60 in Europe, 50

in Japan, 2 in Korea, and a few others in the rest of the world. Another emerging application of MBE machines is the thin-film deposition of new high-critical-temperature superconductor materials (older superconductor materials such as niobium-titanium can also be deposited by MBE, and Riber has also sold one machine for this application). The company reacted very fast; it introduced a machine called SUPRA-32, which is specially designed for such applications. In addition, it is now developing a new industrial-capacity MBE machine capable of processing several wafers simultaneously, either seven 50-mm wafers or four 75-mm wafers. Actually, current epitaxy reactors can process only one wafer at a time. The new machine will be equipped with new wafer supports developed by the company and which will hold the wafers without bonding them to indium (time savings). The machine will also include new and larger cells. The machine prototype is now being perfected and initial delivery is scheduled for next year. Riber is developing this machine jointly with another French company, Picogiga. Picogiga is engaged in the industrial production of GaAs epitaxial films on GaAs substrates and is already equipped with one Riber machine (and will acquire a second one soon). Precisely, Riber was looking for a company with production imperatives for such a collaboration, as this characteristic was deemed indispensable to know the limits of the machine.



Prototype of the Multiwafer Machine Under Development at Riber

Gases to Replace Solid Sources

Other research carried out at Riber involve the development of new cells and their replacement by gases. Two new cell types are now offered. High-temperature cells specialized for MBE silicon doping and cracking cells which make it possible to convert As4 into As2 (for the epitaxy of III-V compounds), in order to reduce arsenic consumption and improve layer purity. The problem with solid-source cells is that they must be recharged from time to time, which requires the machine to be stopped. Hence the development of machines working with gases which Riber calls CBE (Chemical Beam Epitaxy) machines, a term, the company indicated, which is used by Dr Zwang of the Bell Labs. One drawback of gas systems, according to Riber, is that (depending on the gases used) it is not yet possible to obtain every time the same purity as with solid sources.

Riber indicated that it had sold about 15 CBE-type machines and is now manufacturing a two-reactor machine (one solid-source reactor and one gas reactor) for a client. Note that Riber machines are modular in design, the chambers being aligned, so that the user may order a machine with the number and type of chambers he wants. Riber indicated that it had delivered machines with up to 6 chambers. Depending on his budget, the client may even order the machine in several installments, through successive module acquisitions. This modular design also makes it possible to connect the MBE machine to other types of machines, as a clamp is all that is needed to make the connection. Riber has clients who have thus connected the MBE machine to a pulverization and plasma system (a U.S. university) and to a direct ion-beam writing system (a Japanese client).

9294

Thomson of France Announces Reorganization in May 1988

Overview of Changes in Scientific, Military Branches

36980329a Paris ELECTRONIQUE ACTUALITES in French 27 May 88 p 2

[Article: "Extensive Restructuring Announced by Thomson"]

[Text] A "better armed" Thomson-CSF group. Such is the official goal of the group's extensive reorganization plan submitted to the work's council on 19 May.

The plan, which might result in several thousands of layoffs, provides for the closing of several sites and the sale of several operations.

In a communique, the group (which, as is known, employs some 30,000 people) explained that it intends to give to Thomson-CSF "a more concentrated and better armed structure with a better geographical balance." And also to "strengthen" its competitive position.

Added to a strong effort to reduce overhead costs, the plan provides in particular for the creation of an Optronics Division (representing sales of about Fr1 billion).

In addition, the Thomson Hybrids and Microwaves (THM) subsidiary will from now on focus on the development of gallium-arsenide microwave frequency and power applications.

Also, a customer service and support unit will regroup existing maintenance and technical assistance resources.

The hybrid microwave-frequency microelectronics center of the Radar and Missile Electronic Countermeasures (RCM) Division (airborne radars) will become the main pole of these activities at Thomson-CSF.

The engineering and design resources of the Professional Transformer Department will be transferred to two other divisions: the RCM Radar Division (airborne radar) and the SDC Radar Division (ground-based radars).

Airborne display-related activities will be transferred to Bordeaux Le Haillan.

One of the Issy-les-Moulineaux centers will be closed and its resources transferred to two neighboring sites and to the Bordeaux Le Haillan center.

The Cimsa-Sintra Division will optimize the distribution of its industrial resources between the Paris area and Toulouse; in the Paris area, it will be concentrated at a single site.

The Saint-Denis center will be closed.

There will be a redistribution of operations between the Malakoff, Brest and Pessac centers.

The Saint-Egreve site will be reorganized.

The Electronic Tubes Division (DTE) will become a subsidiary, "so as to be in a position comparable to that of its competitors," it was explained.

In addition, its semiconductor operations will be transferred to the TMS subsidiary, which will thus regroup all resources specialized in semiconductor military and space applications.

"This new structure will put the Electronic Tubes Division's operations, which are of strategic importance for Thomson-CSF, in a better position to face technological and market developments," the company pointed out.

The SEDOC company (technical documentation) is expected to be sold to the Sonovision company, the leader in the field.

The company will divest itself of the U.S. display tubes subsidiary (Dover, New Jersey).

Negotiations are in progress to sell the Thomson-CSF Electronic Center of Laval to a regional industrial group.

"In Cholet, in order to offer better development conditions to the mechanical and printed-circuit operations, the creation of a small or medium-size business will be encouraged," the communique indicated.

More Details

36980329b Paris L'USINE NOUVELLE in French 26 May 88 p 31

[Article signed C.A.: "Thomson-CSF Is Refining Its Production Plant"]

[Text] About ten operations reorganized, plants closed or sold: A refurbishing rather than a revolution....

After the layoff plan announced last July and involving about 2,500 people, which was mainly due to a revision of the group's goals, Alain Gomez, chief executive officer of Thomson, is remodeling the industrial plant of Thomson-CSF. This new-generation plan could result in several hundreds or, according to unions, even several thousands of jobs being lost. Concentration and refocusing summarize the plan, which does not alter the group's structure: four main operational branches, two service branches, and one components branch.

The largest, with 13,500 people, is the Aeronautical Equipment Branch (BEA). It will receive the new optronics division and, on 1 January 1989, will thus regroup near Bordeaux operations representing Fr1 billion and 800 people. These are mainly sighting and all-weather guidance systems.

The other main branch, Detection, Control, and Communication Systems (SDCC), with a total of 13,000 people, is also little affected in spite of the eventual closing of two workshops at the large Cholet factory (radio communication equipment). Of the 1,100 people working on the site, 100 were offered to "swarm," i.e., to take over as an LMBO the printed-circuit and mechanical workshops of the factory.... Another closing: the Laval subcontracting workshop inherited from Alcatel in 1983 and already reduced last year from 810 to 500 people. They are looking for a local company to take it over. The Cimsa Sintra Division also belongs to the SDCC. A choice will be made between the Colombes and Velizy sites; part of the personnel would then be transferred to Toulouse.

The Special Components Branch (BCS), 500 people, created after the sale of the civil semiconductor operations, will lose its Electronic Tubes Division (DTE, 3,400 people), which will become a subsidiary. DTE will also lose its U.S. plant in Dover (200 people) which will be sold or closed.

As for the 250 people manufacturing microwave-frequency ferrites in Montreuil, they will be transferred, together with their manager, to Tekelec, which purchased these operations from Thomson just last week... The Hybrids and Microwave Division, which lets them go, will become the GaAs pole of the group. This affirmation of the priority given to GaAs reflects the concerns of the Thomson management; it was forced to sign an agreement with Texas Instruments a few months ago without for all that being assured of becoming the prime contractor of the Rafale radar, for which it is competing with ESD [Serge Dassault Electronics].

Another regrouping involves the creation of a "service unit." Half of its staff of 2,000 or so comes from the closing of the Saint-Denis center.

Not a revolution, therefore; but a recasting in a more efficient mold.

Consumer Division Affected

36980329b Paris ELECTRONIQUE ACTUALITES in French 10 Jun 88 p 2

[Article signed R.F.: "Thomson's Consumer Products Division Reorganized to Cover the Whole World"]

[Text] Thomson has reorganized its Consumer Products Division. New "American-type" structures will be set up, which are clearly not aimed at Europe, much less at France alone, but rather at the whole world.

A French company, a fully-owned subsidiary of Thomson S.A., "Thomson Consumer Electronics," will regroup the activities now controlled by the Thomson Consumer Products and Thomson Consumer Electronics (TCE) companies.

As is known, the latter, TCE, was created in the United States in 1987 to take over the consumer electronics operations of RCA and General Electric.

As for Thomson Household Appliances, it will become a direct subsidiary of Thomson S.A. In this respect, we may well ask whether the special treatment thus granted to household appliances might be the prelude to a sale of this sector in the not too distant future....

Returning to consumer electronics which, unlike household appliances, sees its strategic importance reaffirmed by the current reorganization, we should point out that, as these new integrated international structures are being set up, the development and production of each major product line (televisions, tubes, video, audio) will be entrusted for the world as a whole to a single organization: an operational branch. Three central departments will be created, for Research and Development, Technology, and Trade.

Mr Pierre Garcin, managing director of Thomson S.A., was appointed chief executive officer of Thomson Consumer Electronics. He was CEO of Thomson Consumer Products.

The new TCE entity should achieve total sales of $6 billion this year, Thomson indicated, carefully getting into the habit of presenting the results of its new consumer products subsidiary in dollars rather than in francs...

TCE already represents sales of 8 million of color tubes, 7 million TV sets, 3.5 million VCRs, etc. In over 100 countries. With 40 factories and 50,000 people in 17 countries.

The New Thomson Organization Chart

Headed by Mr Pierre Garcin, the new CEO of the new company, Thomson Consumer Electronics, here is the new organization chart of Thomson's consumer products branch:

Operational Branch Management
Manager of the Television Branch: Joseph F. Fogliano (formerly CEO of TCE).
Manager of the Tubes Branch: Hugues Garin (formerly with Videocolor).
Manager of the Vido Branch: Pierre Creau (until now at Thomson Consumer Products).
Manager of the Audio Branch: Patrick Samier (formerly with TCE).

Central Department Management
Manager of R&D: Erich A. Geiger (formerly with Thomson Consumer Products).
Manager of Technology: J. Peter Bingham (formerly with Philips USA).
General Sales Manager: Matias de Alzua (formerly with Thomson Consumer Products).

Functional Department Management
Manager, Legal Affairs: Jerome de Boissard (until now with Thomson Consumer Products).
Manager, Systems and Quality: Don G. Dight (previously with GE).
Financial Manager: Alain Fribourg (formerly with Thomson Consumer Products.
General Secretary: Claude Toulouse (formerly with Thomson Consumer Products).

We should point out that, within Thomson Consumer Electronics, central department managers and branch Managers will bear the international title of "executive vice-presidents" while functional department managers will have that of "senior vice-presidents," as in any company on the other side of the Atlantic...

9294

French Artificial Vision Machine Tests Electronic Cards

36980329b Paris L'USINE NOUVELLE in French 26 May 88 p 67

[Article by Thierry Lucas: "Electronic Cards: Overall Quality Control with Ida"]

[Text] Now operational, the IDA artificial vision machine will detect any defect in component implantation, without any human intervention.

Developed for the Toulouse Electronic Center (CET) of Thomson-CSF, the artificial vision machine Ida-1024 controls the quality of the electronic cards produced, from component implantation to soldering. It was designed by the engineers of Ximag, a recently created small to medium-size business located in Toulouse and employing about 20 people; Ximag specializes in digital imagery and also sells radiography systems.

The prototype installed at Thomson is operational; the first industrial machine will be delivered by Ximag next September.

To meet Thomson's requirements, Ida has three assets: real-time acquisition of high-definition images; a precision mechanism which positions the cards under the camera; and a variable light system fully controlled by the machine, which can bring out the details to be inspected.

"To control the overall quality of a card," Bernard Oksman, one of the managers-founders of Ximag, explained, "it must be possible to acquire very rich images in a short time. In addition, the software must provide a diagnostic without any human intervention." Defect detection takes place in two stages. In the learning stage, Ida draws up automatically the signature of a card deemed "good"; it notes the location of the pins, the identification numbers and position of the components and packs, at the rate of 12.5 images per second, with a definition of 1,024 x 1,024 pixels coded over 8 bits. This mathematical signature includes only elements which are characteristic of the card, as a full-image comparison would be too complex and a source of errors. The cards manufactured can then be inspected and their signatures compared with that of the typical card. Implantation and other defects (missing or bent pin, etc.) are displayed on the screen, on the card image. If wave soldering is used, the machine can also detect burrs or the presence of microspheres.

"To build our systems," Bernard Oksman told us, "we developed a series of specialized cards to compute, store and display images. Also, we now have a library of image-processing software which we can use for a variety of applications. For the moment, Ida is designed to control inserted components. It could be adapted to inspect surface-mounted components."

The latest improvement to Ida is the addition of transputer cards which will make it possible to complete a test (for a single defect type) in 45 seconds instead of a few minutes, maybe even faster than that if the clients requires it.

In time, 10 machines or so could be installed at Thomson, and Ximag has already contacted distributors in France and in Europe.

9294

Committee To Examine Feasibility of Italian Biochip Program

3698M308 Milan ITALIA OGGI in Italian 6 Apr 88 p 6

[Excerpts] The minister for scientific research, Mr Antonio Ruberti, has recently appointed the members of a committee of experts who will examine the proposal for a national program on biochips, one of the most advanced subjects of scientific research in the world. The program aims at developing more miniaturized, powerful, intelligent and flexible computers capable of performing the same activities as the human brain. Over the past few years, this challenging objective which lies at the frontier of present scientific and technological possibilities has received increasing attention from countries such as Japan (world leader in this field) and the United States.

In June 1987, Montedison—together with SGS-Thomson of the IRI-STET group manufacturing integrated circuits and a Genovese software company Azienda Genovese Autonoma—set up the CIREF [InternationaL Research and Training Center] with the purpose of studying biochips. The center has become one of the promoters of the Italian program which, if adopted, will lead Italy to the forefront of world research.

Mr Claudio Nicolini, professor of biophysics at the University of Genoa and vice president of the ministerial committee on biochips, remarked that "the biochip

is still a long way ahead, and will only be developed as a result of well-planned research." Mr Nicolini had no doubts over the path to follow toward the attainment of this objective. "Two lines of research will have to be developed simultaneously. The first is protein engineering, which will enable researchers to create artificial proteins with the desired electronic, chemical, and physical properties. The most serious problem that protein engineering still has to solve is to discover the correlation between the primary structure, i.e. the amino acid chain that constitutes the protein, and the tertiary structure, the three-dimensional form that determines the protein's function. Once this correlation has been found, intervention will be possible on the primary structure to create a protein able to perform the desired function.

"The other research line regards the employment of silicon technology to create new kinds of chips based on neuron networks. The various models proposed by researchers on the basis of their studies of the brain will have to be tested in order to choose those with highest levels of performance and suitability for the purpose. The biochip will only be developed once tangible results are reached both in protein engineering and in research on neuron chips."

In Mr Nicolini's opinion, the next five years will show whether researchers will be able to obtain concrete results, and "even if the development of biochips proves to be lengthier and more complex than expected, the spur given to the two advanced sectors of protein engineering and neuron microelectronics will make Italy competitive at international level. It would be one of the few instances in which Italy set forth with an advanced research plan on a global level instead of following the more customary path of pursuing something already achieved in other countries."

Mr Nicolini has outlined some of the characteristics of future biological computers, the design of which, however, is still difficult to predict, "Present, silicon-based computers are constructed according to what is known as 'scale-down procedure', as the circuit is first designed and then printed in a miniaturized form on the chip by using lithographic methods. The reverse will be done with biological computers, for which a sort of 'scale-up procedure' will be followed starting from the basic building blocks. First the amino acid chains will be formed to create proteins with specific functions, then the ability of proteins to self-assemble will be used to obtain the actual computer. Mr Enrico Villa, who works for SGS-Thomson and is the vice president of CIREF, explained that miniaturization would be carried even further, "Silicon-based technology now allows the construction of devices with a channel length, i.e. the distance between two elements on a single chip, of the order of a micron (1 micron = one thousandth of a millimeter), which means that over one million single elements may be placed on a VLSI chip. The materials currently used are believed to allow miniaturization down to 0.3 micron, whereas proteins will permit the construction of circuits which are thousands of times smaller."

/12223

NUCLEAR ENGINEERING

Fiat, Ansaldo To Design Ignitor Nuclear Fusion Reactor

3698M320 Milan ITALIA OGGI in Italian 9-10 Apr 88 p 20

[Article by Lorenzo Guglielmi]

[Text] Rome—An artificial, fully "made-in-Italy" sun may shine on the shore of the Lago Maggiore: Enea [National Committee for the R&D of Nuclear and Alternative Energies] decided to carry out, probably at Ispra, the Ignitor project for nuclear fusion developed by the scientist Bruno Coppi.

Yesterday, Enea, which is headed by Umberto Colombo, granted a Fiat-Ansaldo consortium the contract for the actual design of the experimental machine, which is to reproduce the reactions occurring in the stars. In 4 months, once the feasibility study has been completed, Enea is to submit to the Italian government its proposal for the plant construction, which should cost, depending on the time required between 150 and 300 billion lire. However, Enea has set the stage and Colombo is confident of having made the right choice. "We have advocated and we are to support Coppi's project, since this is the first igniting experiment based on magnetic confinement and on the use of existing technology."

There have been talks on the project Ignitor for some years now. Bruno Coppi finalized it at the Massachusetts Institute of Technology, where he has been working since 1969, reaching successful results with the Alcator projects in the area of nuclear fusion.

But what is Ignitor designed for? It is a machine which should demonstrate the scientific feasibility of a fusion reactor; it should ignite a deuterium and tritium mixture (these are hydrogen isotopes) and thus produce energy. The success of this experiment would prove to be a major step towards industrial application of nuclear fusion. We might therefore reach that memorable day when we will finally be able to produce clean, low-cost energy in large quantity.

Coppi is very happy to be able to carry out his project. "It has been finally realized that fusion is a real energy form. However, it is necessary to proceed step by step in this sector; the most important thing is to light the first candle, then we will see whether it is cost-effective or not." Coppi, however, would like to speed up the Enea schedule, he fears possible bureaucratic bottlenecks, he would like to start constructing the reactor as early as end of 1988 to complete it in 3 years.

Completion times are still uncertain. The contract with the consortium schedules 18 months for the executive design, but it has still to be established whether EURATOM (which has a 25 percent share in the feasibility study) is willing to locate the plant at Ispra. Then component production will have to wait for funds appropriation by the Italian government. Furthermore the EEC still has to recognize the project politically and that approval is scheduled to be sought by Minister Antonio Ruberti—as announced yesterday by Under Secretary Learco Saporito—on the occasion of the meeting of Community research ministers in Luxembourg on 11 April.

Industry is particularly interested in this initiative, which opens up new prospects in the fusion sector, after cutbacks suffered in the nuclear program. The contract for the project design, which is worth 14 billion lire, was awarded to a Fiat-Ansaldo consortium; its main subcontractor is Tecnomasio Italiano Brown Boveri. The consortium coordinator, Mr Previti announced that the consortium will make a bid for the plant construction, once the design stage has been completed.

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ENEA Director Interviewed on Italian Ignitor Program

3698M382 Milan ITALIA OGGI in Italian 26 Apr 88 p 6

[Interview with Umberto Colombo, ENEA [National Committee for Nuclear and Alternative Energies R&D] chairman, by Lorenzo Guglielmi: "ENEA Believes in the Fusion Project; Colombo Explains Why; But This 'Ignitor' Is Going To Burn Us (300 Billion Lire); date and place not given]

[Text] Nuclear fusion has great potential, but it will be at least 30 to 40 years before it can be used. Umberto Colombo, chairman of ENEA, is convinced that we have to intensify research in this area, especially in light of the crisis in traditional nuclear energy. In this ITALIA OGGI interview, Colombo explains why ENEA has decided to develop Bruno Coppi's Ignitor project which will be used to demonstrate the scientific feasibility of fusion, the ignition within a reactor of an "artificial sun." However, Colombo is not deterred by the length of time needed to build this experimental machine which will be set up in Ispra (it will cost between 150 and 300 billion lire); neither does he disguise the difficulties involved in obtaining authorizations through the bureaucracy or the possible misunderstandings on the part of the EEC.

ITALIA OGGI: Professor Colombo, has the decline of traditional nuclear energy in Italy encouraged ENEA's activities in the clean atom and alternative energy fields?

Umberto Colombo: Renewable sources and nuclear fusion are two promising elements for our long-term energy future; the two complement each other. The abrupt halt in nuclear fission causes us more immediate problems, but it also encourages Italy to intensify its efforts and somehow shorten the deadlines for these longer-term options.

ITALIA OGGI: But we have heard about Bruno Coppi's Ignitor project for several years now. Why is ENEA adopting it only now?

Umberto Colombo: What you say is not true. ENEA has been following the evolution of Ignitor with interest since the beginning. Professor Coppi, the man behind the project, has been a much esteemed consultant for the agency since the early 1970's. ENEA financed a feasibility study and committed itself to encouraging approval for the project on the European level. Moreover, it was precisely as a result of Professor Coppi's ongoing relationship with ENEA and the EEC that the Ignitor project evolved from a preliminary machine designed with features different from the currently defined ones to the more reliable and scientifically more useful machine it is today.

ITALIA OGGI: ENEA has given the experimental reactor executive project to an Ansaldo-Fiat consortium, but to move to the production phase, approval from the government, which is supposed to finance it, is needed. Do you think everything will move ahead smoothly?

Umberto Colombo: It seems to me that there is a very solid majority in parliament favoring a vigorous commitment to research on nuclear fusion which offers long-term prospects as a practically inexhaustible supply source and which can also be developed with new cycles of fuel characterized by very limited environmental damage. If, as we believe, the Ignitor executive project drawn up by the Ansaldo-Fiat consortium produces satisfactory results, we should have no difficulties in obtaining government approval and the necessary financing.

ITALIA OGGI: What distinguishes Ignitor from other experimental programs underway in Italy and the world in the field of nuclear fusion?

Umberto Colombo: Ignitor has set for itself the goal of achieving the conditions for plasma "ignition," under which the energy produced by the nuclear fusion reactions and passed on to the plasma is sufficient to maintain the plasma at such a high temperature that it continues to produce reactions. It's a little like starting a fire in the fireplace so that the wood keeps on burning. However, while a wood fire can reach temperatures of 1,000 degrees C, the plasma once "ignited" goes as high as 100-200 million degrees C. Containing plasma at these temperatures is a very difficult technological problem. Until recently, we hoped to achieve this goal with

the large European Jet machine now in operation near Oxford, but now we know that this will not be possible in its current form and, anyway, this goal is not at all certain.

ITALIA OGGI: What does the EEC think about this Italian initiative? Is there any hope of getting the European Community involved in the project?

Umberto Colombo: Some time ago the EEC appointed a high-level group of experts chaired by Sir John Adams to examine the Ignitor project. The group confirmed its strong scientific interest in this machine; however, it pointed out some areas of uncertainty concerning the machine's feasibility in the then proposed version. These are points which Coppi has fully resolved in the last few years. In effect, the current initiative should not be only viewed as an Italian project, but as a project which Italy (namely ENEA and Italian industry under the scientific leadership of Bruno Coppi) is developing within the context of the ENEA-Euratom fusion project. In other words, this is already an EC initiative. Personally, I believe that the widely held perception in European scientific circles that there will be long bureaucratic wait between the time the European jet machine ceases to operate and the launching of a new, more ambitious large-scale EEC machine (the Net, New European Torus) helps Ignitor's cause in real terms.

ITALIA OGGI: What are some of the obstacles you could run into?

Umberto Colombo: The principal obstacle is the cool attitude of certain European governments, especially that of Great Britain, towards nuclear fusion. However, I am sure that the Italian government will prove its point. Moreover, Italy has made some generous proposals to its European partners, maintaining that it is willing to cover 75 percent of Ignitor's costs and to accept, at least partially, EC contributions in kind.

ITALIA OGGI: A deadline of 18 months has been set for the executive project. According to Coppi, plant construction could take 3 years. Can these deadlines be met?

Umberto Colombo: I understand Coppi's enthusiasm and I admire the fact that he never lets obstacles get him down. But it seems to me that this time estimate is optimistic. It does not take into account some objective difficulties which are linked to the time needed for design and construction, on the one hand, and, on the other, to the approval process. Even if this approval process is simpler than that required for nuclear plants, it still has to go through some very rigorous steps. This does not mean that we should not all try to respect these very short deadlines if we hope to make plasma ignition a European accomplishment. Let's not forget that the United States is involved in a project very similar to Ignitor.

ITALIA OGGI: People don't want traditional nuclear energy and the fossil fuel feeder plants often have deleterious environmental effects. Many people consider nuclear fusion to be the solution to all our energy problems. But what can we reasonably expect from fusion? And how soon?

Umberto Colombo: There is still a long way to go before nuclear fusion becomes an economical and widespread energy source. It is still too early to foresee what the fusion plants of the future will be like and how people will react to them. As I said earlier, fusion certainly presents fewer environmental and security problems than does fission. Most of all, it is important that fusion plants be designed to reduce environmental problems to the minimum. At least 15 to 20 years more will be needed before we have an exact idea of the costs of fusion energy, and at least as much time before nuclear fusion begins to become a real factor in the world's energy system.

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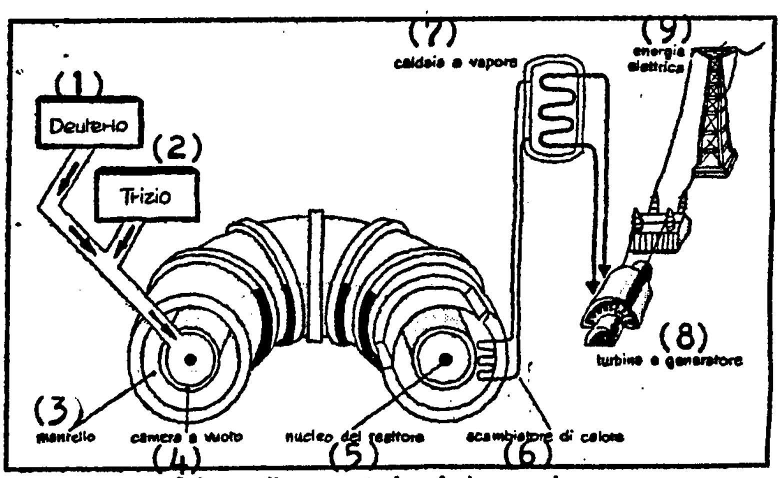


Schema di una centrale a fusione nucleare

Diagram of Nuclear Fusion Plant

Key:—1. Deuterium—2. Tritium—3. Shell—4. Vacuum chamber—5. Reactor nucleus—6. Heat exchanger—7. Steam boiler—8. Turbines and generators—9. Electric energy

SCIENCE & TECHNOLOGY POLICY

EC Announces Status of Community R&D Policy

3698a240 Brussels BULLETIN OF THE EUROPEAN COMMUNITIES in English No 12, 1987 (sent to press Mar 88) pp 29-33

[Text]

I. Research and Technology

A. Community R&D Policy

1. Council

On 21 December the Council adopted a decision revising the multiannual research and training programme in the field of radiation protection.

The Council also adopted common positions, which will be sent to Parliament under the cooperation procedure, on the second phase of the European strategic programme for research and development in information technology (ESPRIT II) and on the revision of the multiannual research and development programme in the fields of basic technological research and the application of new technologies (BRITE).

Finally, the Council had an initial discussion on the Commission's communication "A New Outlook for the Joint Research Centre," concentrating on the general aspects and the principles underlying the Commission's proposal.

2. Coordination of National Policies

At its meeting in Brussels on 10 and 11 December the Scientific and Technical Research Committee delivered two opinions, one on the revision of the multiannual R&D programme in the field of biotechnology (1985-89) and the other on the new programme in the field of applied metrology and chemical analyses (1988-92) for the Community Bureau of Reference (BCR). The Committee considered that the broadening of Community activities in the biotechnology field and the new BCR programme, designed to provide technical support for the Community's standardization efforts, were both very much in keeping with the framework programme of research and technological development (1987-91), and therefore endorsed the Commission's proposals.

The Committee took an initial look at the Commission's proposal concerning a new FAST forecasting programme and also closely examined the Commission's proposals for renewing the JRC [Joint Research Center].

The Committee discussed a Danish proposal concerning Community participation in EUREKA and a proposal made by the United States in the OECD relating to a framework for an international science and technology policy. The Committee thought that these two matters deserved more detailed examination.

3. Stimulation of European Scientific and Technical Cooperation and Interchange

In Lisbon on 9 December the Committee for the European Development of Science and Technology (CODEST) recommended the Commission to select 14 new projects representing a total amount of 2.8 million ECU as part of the stimulation plan (1985-88). These include projects concerning certain aspects of Parkinson's disease, mapping the genome of the vinegar fly, and interpreting ERS satellite data. The Committee also debated proposals to create a "European Scientific Assembly" and endorsed the Commission's superconductivity initiative involving the programmes affected by recent developments in this field.

An international conference on biocommunication was held in Paris from 1 to 4 December, organized by CODEST together with the Commission. The conference, which was attended by 250 scientists, reviewed present knowledge and future prospects in the field of mapping the human genome.

4. COST Projects

Three memoranda of understanding were signed in December: on COST Project 506 (Industrial Application of Light Alloys) by Norway and on COST Projects 306 (Automatic Transmission of Transport Data) and 74 (Utilization of UHF/VHF Wind Profile Network Radar for Improving Weather Forecasting in Europe) by Italy and Finland.

5. Space

On 22 December the Commission adopted a memorandum on the Community's role in space, asking the departments concerned to prepare a communication on the subject for transmission to the Council and Parliament in the course of 1988.

B. Sectoral R&D

1. Nuclear Fusion Energy

On 29 December the Commission transmitted to the Council a draft decision concerning the conclusion by the Commission of the agreement on Euratom's participation in the International Thermonuclear Experimental Reactor (ITER) conceptual design activities, together with Japan, the USSR and the United States. The Commission negotiated the agreement in accordance with directives given by the council on 5 October.

2. New Technologies

a. BRITE Programme

In response to the opinion delivered by Parliament, the Commission transmitted to the Council on 8 December a proposal amending the Decision of March 1985 concerning a multiannual R&D programme in the fields of basic technological research and the application of new technologies (BRITE) (1985-88).

On 14 and 15 December in Brussels the Commission held the first BRITE technological days. The first results and a progress report on 25 of the most representative projects in the programme were presented.

This event, with 1,200 participants, was basically conceived as a forum for discussion and exchange of information and experience between existing and potential partners in BRITE. The BRITE technological days also provided an opportunity to assess the progress made in the programme as a whole and its future development prospects.

b. Biotechnology

On 22 December the Commission transmitted to the council a proposal for a decision to adopt a first multiannual programme (1988-93) for biotechnology-based agro-industrial research and development, ECLAIR (European Collaborative Linkage of Agriculture and Industry Through Research).

Prepared in consultation with European agricultural and industrial circles, notably on the basis of replies to a call for expressions of interest published in July 1986, this programme is intended to promote the agro-industrial application of recent advances in the understanding and control of living systems. These advances should enable substantial changes to be made to the species grown, to cultivation methods and to the use of the products cultivated. Projects to be included in the programme are likely to concern, for example, the production of new or improved varieties of plants or microorganisms, the development of products, processes or industrial services upstream (for example to do with improving plant health or nutritive value) and downstream of agriculture (production, extraction and transformation of biological materials—sugars, starches, oils, fats—into substances of industrial interest or energy products).

3. Traditional Industries—Scientific Standards: Reference Materials and Methods

On 16 December Parliament adopted a legislative resolution under the cooperation procedure embodying its opinion (first reading) on the Commission's proposal for a regulation on an R&D programme in the field of applied metrology and chemical analyses (1988-92) for the Community Bureau of Reference.

On 17 December the Economic and Social Committee delivered its opinion on this proposal.

4. Health and Safety

On 10 and 11 December, in Brussels, the Commission held a European Conference on the clinical aspects of AIDS, as part of the programme for the coordination of medical research in the Community (1987-91). This conference, which was attended by the leading European and US clinicians, discussed the various pathological aspects of HIV infection (neurological and pulmonary manifestations, secondary cancers, etc.). Several of the papers concerned the present outlook for treatment both of HIV infection and of the opportunistic complaints which develop as a result of the weakening of the patient's immune defence system. The psychological problems connected with the different pathological aspects of AIDS were also discussed.

a. Radiation Protection

On 21 December the Council adopted a decision revising the multiannual research and training programme for the European Atomic Energy Community in the field of radiation protection (1985-89). This decision increases the programme funding from 58 to 68 million ECU; the increase will be used to finance research into the short-term and long-term effects of nuclear accidents like the one at the Soviet nuclear power plant at Chernobyl in 1986.

On 17 December Parliament had adopted a legislative resolution closing the procedure for consultation on this proposal.

The fourth international symposium on natural radioactivity in the environment took place in Lisbon from 7 to 11 December, organized jointly by the Commission, the Office of Health and Environmental Research of the US Department of Energy and the Radiological Protection and Safety Department of the Portuguese National Engineering and Industrial Technology Laboratory under the Community programme of research in the field of radiation protection (1985-89).

This symposium, which was attended by some 200 research workers from 25 countries, reviewed the present state of knowledge of radioactivity of natural origin and the risks associated with it, in particular the hazards of exposure to radon, a radioactive gas which is contained in certain rocks and can be released by the soil and combustion products.

b. Research into the Social Aspects of Coal

In accordance with Article 55(2) of the ECSC Treaty, on 21 December the Commission transmitted to the Council for its assent a memorandum on the adoption of a fifth medical research programme for the protection of

workers against risks arising from work in the coal and steel industries (1988-92), for which a total appropriation of 12 million ECU is proposed.

Pursuant to Article 55 of the ECSC Treaty, the Commission decided to grant 487,000 ECU towards two research projects in the fifth ECSC programme of ergonomics.

5. Development Aid

On 14 December the council adopted a decision relating to a research and development programme in the field of science and technology for development (1987-91). With funding amounting to 80 million ECU, this new programme follows on from the first (1983-86) and covers the two areas which are of vital and priority interest to Third World countries—agriculture and health.

For the purpose of implementing this second programme, the Commission published two calls for proposals, for the tropical and subtropical agriculture subprogramme and for the medicine, health and nutrition in tropical and subtopical areas subprogramme.

6. Improvement of Scientific and Technical Cooperation

On 17 December the Economic and Social Committee delivered its opinion on the proposal for a Council Regulation adopting a Community plan of support to facilitate access to large-scale scientific facilities of interest to Europe.

Also on 17 December the Committee gave its opinion on the proposal for a Regulation adopting a five-year (1988-92) plan to stimulate the international cooperation and interchange needed by European research scientists.

II. Telecommunications, Information Technology and Innovation

1. RACE

After considering the amended Commission proposal under the cooperation procedure, the Council adopted on 14 December a decision on the Community programme in the field of advanced telecommunications technologies (RACE).

Five hundred and fifty million ECU of Community funds has been allocated to this five-year programme. It is designed, in conjunction with public and private action—both national and international—in the field of telecommunications technologies, to promote the competitiveness of the Community's telecommunications industry, operators and service providers in order to make available to the final users, at minimum cost and with minimum delay, the services which will sustain the competitiveness of the European economy over the coming decades and contribute to maintaining and creating employment in the Community.

2. ESPRIT

On 21 December the Council adopted a common position, to be transmitted to Parliament under the cooperation procedure, on the second phase of the European R&D programme in information technology (ESPRIT II).

On 4 December the Commission had sent to the Council an amendment to its proposal, in the light of the opinion delivered by Parliament.

On 29 December the Commission published a fourth call for porposals for this programme (the first call for this second phase).

3. Information Market

On 16 December Parliament adopted a legislative resolution embodying its opinion (first reading) on the proposal for a decision concerning the establishment at Community level of a policy and a plan of priority actions for the development of an information services market. This proposal was favourably received, and the 19 amendments adopted by Parliament complement rather than alter it. The Commission accepted all of these amendments and will be presenting an amended proposal.

Support for EC S&T Cooperation Program 'COST' To Continue

3698a237 Brussels EC PRESS RELEASE in English No IP(88) 224, 19 Apr 88 pp 1-2

[Article: "COST Cooperation Should Be Continued"]

[Text] In a recently adopted communication to the Council, the Commission takes the view that COST [European Cooperation in Scientific and Technical Research] cooperation should continue to receive Community support as it has specific features of its own and is complementary to other forms of cooperation for research that have been developed over recent years.

Set up in 1971, COST paved the way for other forms of cooperation. It is a framework for cooperation which allows either the coordination of national research projects or the participation of non-member countries in Community programmes and generally involves basic or precompetitive research or research of public utility.

COST cooperation covers a wide area of Europe since its members include, in addition to the Community countries, seven non-member countries, five of them in EFTA [European Free Trade Association] (Austria, Switzerland, Norway, Finland and Sweden) together with Turkey and Yugoslavia.

The COST agreement and projects may be divided into two groups. In the first, they form an integral part of a Community programme and therefore involve Community financing with contribution from the non-Community countries towards the implementation of the programme. In the

second group, the research is pooled and the rule is that each participating State accepts responsibility for the costs it incurs, while the relatively low costs of coordinating this cooperation are mainly paid by the Council and the Commission.

Valuable features of this cooperation include the option open to each COST country to put forward a proposal and the right of any other interested State to approve it and participate in its implementation.

The European context in which COST cooperation has developed has undergone far-reaching changes since COST's inception in 1971, which means that the different factors involved in the changing European scientific and technical scene must be taken into account when endeavouring to map out the future of COST.

In chronological order, these factors are: the development of Community research, the enlargement of the Community, the tightening of links between the Community and the EFTA countries, the launching of the EUREKA venture in 1985 and the Single European Act now explicitly providing for cooperation in research and technological development with non-member countries.

The Commission considers that there is room for different forms of cooperation established on the basis of Community research programmes, framework agreements on bilateral cooperation, EUREKA projects and COST projects. The use of these various forms of cooperation satisfies, with greater flexibility than in the past, the scientific and technical needs of the Community and of non-member European countries.

In comparison to Community research and the framework programme, access by non-member countries to Community programmes was made possible and facilitated by the existence and flexibility of COST cooperation. Moreover, a number of Community programmes has originated from proposals for COST projects.

The COST framework covers a wider geographical area than the bilateral framework agreements with the EFTA countries.

EUREKA and COST generally follow a similar approach with their flexibility of operation and "a la carte" participation but cooperation under COST is more open than the EUREKA framework where those who put forward a project may refuse applications for participation from others. The other distinguishing criteria show that there are complementary features between the two forms of cooperation.

In the light of these complementary features, the Commission considers that, although agreements in the first group—Community programmes—can be continued within the COST framework as before, those in the second group—pooling of research—should be strengthened by investigating more closely new avenues of scientific and technical research and by giving the Commission departments the right to put forward proposals for these categories. In addition, the Commission undertakes to review this group of projects in fields which are now also covered by Community programmes. This will be done when specific programmes are adopted or existing programmes revised.

The COST framework could also be used for the implementation of complementary programmes when the number of Community States interested in the programmes is less than twelve, with or without the participation of non-member countries, as provided for in the Single Act.

'Massive' Response to ESPRIT II

3698a239 Brussels EC PRESS RELEASE in English No IP(88) 266, 21 Apr 88 pp 1-2

[Excerpt] Commission Vice-President Karl-Heinz Narjes expressed his great satisfaction at the massive response to the first call for proposals for ESPRIT II: 700 proposals have been received, from companies, universities and research institutes throughout the Community.

This call for proposals, published in December 1987 as soon as ESPRIT II had received the preliminary accord of the Council of Ministers, closed on 12 April 1988, the day after the programme was given the final go-ahead.

The total financial envelope of the second phase of ESPRIT (the European Strategic Programme for Research and Development in Information Technology) is ECU 3.2 billion, 50 percent of which comes from the budget of the European Communities. This first call for proposals is expected to lead to projects to the value of ECU 1.2 billion. As the total value of the projects submitted is ECU 10 billion, the selection process will be extremely stringent.

The 700 proposals received are divided between the different areas of the ESPRIT Work Programme as follows:

Microelectronics and Peripheral Technologies	17%
Information Processing Systems	33%
IT Application Technologies	50%
subdivided into:	
—Computer Integrated Manufacturing	25%
—Integrated Information Systems	14%
—IT Application Support Systems	11%

Many proposals have come from organisations not previously involved in ESPRIT, while some are from organisations already participating, often through a different department or laboratory. Detailed analysis is still proceeding, but it is already clear that there are several hundred such newcomers among the organisations which have responded to this call.

For strategic advice on the programme the Commission draws on the expertise of some of the most distinguished figures in the European information technology community, both industrial and academic. These leading personalities will form the new ESPRIT Advisory Board (EAB), whose inaugural meeting, held in Brussels today, was addressed by Commission Vice-President K.H. Narjes. The EAB will advise the Commission on all the essential phases of the programme, including strategic orientation, project selection and programme evaluation. The overall management responsibility for the programme lies in DG XIII.

Bureaucracy's Role in FRG Technology-Oriented Startups Described

36980332b Munich INDUSTRIEMAGAZIN in German Jun 1988 pp 162-168

[Text] High-tech promotion. Bonn's funding program for new technology businesses begun with good intentions but also with much rash self-laudation is being smothered in bureaucracy. The new entrepreneurs are footing the bill.

Heinz Riesenhuber's ears must really be ringing, because probably scarcely a day passes without at least once a fervent prayer being sent up from the technology shops of the nation to the chief of the Federal Research Ministry (BMFT) in Bonn. Because 5 years ago, shortly after the change in government, the minister with the bow tie adopted a startup aid program for high-tech company founders in a much publicized heave-to project.

However, many people would be better off today if the minister had less impulsively fallen in love with the German startup scene. Because the attempt to promote technology-oriented business startups—called TOU for short—did, to be sure, entice 4,406 applicants to make an initial inquiry by the deadline of 30 June 1987, and of these 336 have been included in the program so far and another 172 are still in the examination stage. But now it can be feared that the rate of flops will go beyond what is usual for firm startups.

The reason: The unbalanced dialogue between administrative officials and newcomers unused to subsidies is leading to conspicuous damage due to ill feelings within the maze of bureaucratic application and handling formalities. Moreover, in their haste Bonn's strategists on startups had underestimated the financing problems. They figured the firms' own needed capital too low, so that necessary interim financing during the product development phase has heaped alarming masses of interest and debt upon the new firms.

Riesenhuber today: "That is an unavoidable situation given the criteria for the administration of public monies, but it is still most unpleasant." Apart from that, he says, it is already a part of the definition of this program as a model experiment that what is important here is to gain experience.

This experience is now causing second thoughts, because in the ministerial model it is just the very difficult market exploitation for high-tech products that is being planned with loans that are too short-term. Even if the newcomer enjoys unusually good earnings the subsequent interest service alone swallows up money in such a way as to narrow the leeway for refinancing.

Finally, the commitment of the venture capital companies to the promoted high-tech firms has remained far behind expectations.

"There is certainly no cause for euphoria" so warns Helmut Hoff, head of the Munich branch of the Genes Startup Consultation and Management Service GmbH: "One must be very cautious with this promotional program."

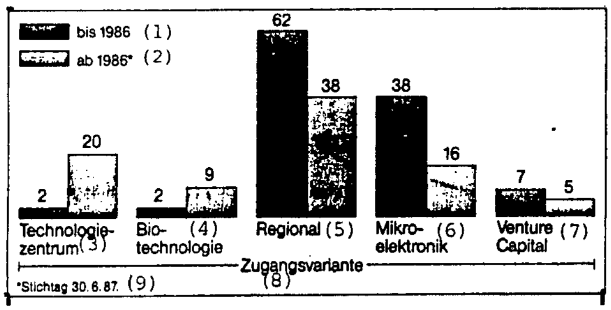
Thousands Snap at the Bait from Bonn

In the TOU model experiment the BMFT undertakes to pay 90 percent of the costs—with irrecoverable grants not exceeding DM 54,000—for drawing up experts' reports, for market and patent searches, and for the construction of functional models. Furthermore Bonn has a 75-percent involvement through irrecoverable grants—DM 900,000 at most—in the development costs proper for a new product and for the establishment of a separate company. Financially weak founders who cannot pay in their own required capital resources of 25 percent of the project costs and also do not have sufficient collateral can get this sum via their own bank. Because the German Equalization Bank will vouch for 50 percent of this loan by means of a risks indemnity guarantee.

For the costs of production developmen, and marketing the Federal Government is announcing a risks indemnity guarantee—likewise via the German Equalization Bank in Bonn/Bad Godesberg—of up to a maximum of DM 1.6 million, with which the young TOU business can provide security for 80 percent of a bank loan. The founder himself must answer for the remaining 20 percent.

From the very start there were available as pump-priming agencies five sponsoring bureaus within the federal territory and one central office in Berlin specifically for all microelectronics projects, where on behalf of the BMFT the suitable projects are selected and sponsored. The financial handling of the promotional program is the responsibility of the officials in Bonn.

"We are convinced," enthused the enterprising research minister with a sidelong glance at the legendary high-tech El Dorado in California's Silicon Valley, "that in this country as well there are a good number of technical intellects and entrepreneurs who are just waiting for the day when innovative products no longer grow moldy in desk drawers."



The Five Paths to the Good Life—Number of Publicly Funded Development Projects

Key:
1. Until 1986
2. From 1986 on*
3. Technology center
4. Biotechnology
5. Regional
6. Microelectronics
7. Venture capital
8. Types of access
9. Deadline date 30 June 1987

He was right—more so than was welcome to his officials. Because immediately after his announcement, long before the guidelines became binding in the Federal Legal Gazette, the telephones were ringing off their hooks in the six advisory offices. Soon hundreds of applications, product descriptions, and business concepts were piling up on the desks of the project officers. "We did not count on this flood of applications," the department head responsible for TOU projects in the BMFT, Dr Hartmut Grunau, was forced to admit already after a few months.

That is, it was to take months yet before even the initial application forms for the impatient technology pioneers had been prepared, not to mention guidelines on the manner of completing arrangements. The advisory offices, above all the VDI [Association of German Engineers] technology center in Berlin, kept pushing ahead of them a "gigantic shock wave of applications" (Grunau), and before 1984 not a single one of them went from here to the Federal Research Ministry for its approval.

The initiators also got into a bureaucratic jungle with the risk guarantees via the German Equalization Bank: "At the beginning of the TOU model experiment by no means had we discussed all the technical details yet," recalls Juergen Weiske of that bank with uneasiness even today. A similar thing happened with many bank managers, whose doors were being battered down all over the country by enthusiastic TOU aspirants, who dismissed all questions about collateral normal in banking for startup loans by referring to the guarantee from Bonn.

However, the German Equalization Bank wanted to guarantee only already approved applications. But the green light from Bonn was received only by those who could prove that their own bank was granting credit—a vicious circle. "Most of the founders had taken at face value the promise about unbureaucratic support," as Josef N. Braun, the appropriate department manager in the Munich bank of Reuschel & Co., describes the chaotic initial period of the model experiment, "and it was difficult to bring them down to the hard ground of reality."

Red Tape Rouses People from Pioneer Dreams

Hardly anybody had figured that many months and sometimes even years would pass over the tormentingly slow application procedure before at last the first money from Bonn entered into the business account of the new firm. The founders financed this waiting time with sometimes unsecured loans from their thereby unnerved banks. "Because someday," consoled themselves both moneylenders and founders, "surely the windfall will come." Thus in many cases the financing of the young business quite gradually became rudderless. "When the approval finally came, the original financing plan was already wastepaper," startup founder Uli Seng in Starnberg was obliged to declare.

But the slowly grinding mills of the administrative startup administrators cost not only loan interest. Via the red tape with the examination authorities the projects on the fast-moving high-tech scene were often just overtaken by technological developments. When the approval for subsidizing the development costs finally drifted in, the diligent tinkerers had already changed their technical concept under the pressure of competition.

"After all, the competition does not sleep," confirms Klaus Engelhardt from his experience in advisory work as former head of the Ruhr Technology Consultation Office in Bochum. And he adds: "Even in large-scale businesses an innovative project never proceeds methodically quite according to plan." And thus there happened to the new entrepreneurs what is not foreseen in government assistance concepts, and so inevitably causes trouble: Gaps yawned between plan and reality.

The consequence of such departures from plans: The overworked BMFT officials demanded of the pioneers new written clarifications, new plans, job-packet descriptions, and financial proofs, and—in the worst of cases—they just stopped the money grants.

"Where it takes Siemens only a few days with an experienced crisis staff to express a concept change in words that are suitable to the BMFT and are administratively unobjectionable, the TOU founders who were inexperienced in this area quite inevitably got into trouble," declares Michael Mayer of the Fraunhofer Institute for Systems Technology and Innovation Research (ISI), which carries out for Bonn the project-accompanying studies for the model experiment.

Bonn's administrative apparatus was overtaxed at every turn with trying to give the sort of flexible treatment that experience teaches is required for a high-tech project: "The officials can compare target and actual figures, but alterations throw a monkey wrench into the smoothly running machinery," says Mayer in criticism of this congenital defect in the planning of the TOU model experiment. There is an obligation to report changes in concept and departures from the plan, according to the TOU program. And the only familiar immediate response trusted by the officials from their subsidy practice is: Block funds until the project's worthiness to receive assistance has been credibly presented anew by the founder.

And that can take time, if it does not actually become a threat to the project's existence. Because the banks turn off the credit spigot, bills and salaries remain unpaid, key employees threaten to quit, and suppliers feel that they have been put off. The young businessman scarcely has any time left for his high-tech development, but suddenly is fighting on all fronts as a trouble-shooter.

It is the founder together with his wife personally who are exclusively liable for additional overdrafts, if despite a lack of collateral the bank still grants these. Because the newly founded TOU business surely is still in the development phase, normally does not yet have any sales, and can scarcely be judged according to criteria normal in banking for provision of security. TOU grants, paid out under the reservations customary to subsidies, cannot be carried as an asset on a balance sheet.

If then a young businessman as the manager of a corporation with capital of DM 50,000 has to go to the bankruptcy judge due to insolvency during the development phase when there are large liabilities—something that the idea of the model experiment is really designed to provide a stopgap against—in the worst case he is even threatened with imprisonment because of protracted overindebtedness. "Much was done sloppily here in the conception," says Mayer reproachfully about the naive TOU program tailors in Bonn.

In this vicious spiral of innovative product development, departures from the plan, blocking of funds, and liabilities, the consultants play a key role as mediators between Bonn and the new technology firms: They can be a help or a hindrance. Thus Mayer sees as another congenital defect of the TOU model experiment the fact that all the microelectronics projects had to be handled centrally via the VDI technology center in Berlin. After all, this applies to about 70 approved companies and hundreds of applicants. "As a central advisory office, Berlin has led to trouble from the very beginning," remembers Mayer: "The distance to the founders, predominantly from the southern German region, was too great. Extensive changes in personnel and a lack of technical competence by individual consultants on economic and technical questions hampered contacts with the entrepreneurs in crisis situations."

Government Financial Aid Gets Caught in a Trap

Then they have to foot the bill, because Bonn wanted to save at the wrong end. "Because where are the top people in the consultation offices to come from, given the modest salaries involved," is the question asked of the BMFT by Michael Kuhn, TOU point of contact at the Ruhr Technology Consultation Office (tbr) in Bochum. This trained process engineer is now 31 years old and along with two colleagues provides service to a total of about 60 TOU firms. He openly admits that in 1984, when he began at the tbr, he also was lacking the business-management knowledge necessary for giving sound advice: "Like many of my colleagues, I picked this up by training on the job."

High-quality consultation and short distances between founders and sponsors become all the more important the closer the hopeful youngster company approaches market introduction. At present this is true of the overwhelming majority of all TOU firms, about 200 in number. If despite everything the product development has been concluded and mass production and marketing are imminent with loans procured exclusively on the capital market, the most dangerous period arrives for the survival of the young technology firms.

And here also Bonn's funding strategists have come in for criticism. In connection with the projects too much weight has been placed on innovative technology and too little on market chances. As business consultant at the firm Incom GmbH in Nuernberg, Guenter Fandrich has helped about 20 parties interested in TOU in the application phase and has followed their further development: "Almost all of them were making terrific products but only two firms weathered market introduction fairly well," his alarming stocktaking concluded.

Also the former marketing pro plainly questions whether many of the high-tech founders funded by Bonn have the know-how for successful product marketing: "For the most part these are excellent technicians without a marketing mentality or an appropriate professional experience." Thus in an already risky phase the new entrepreneur must hire market specialists with high-tech experience for a good deal of money. Because the German market with its high demands on quality and service does not make it easy on newcomers. In the opinion of the Nuernberg business consultant the BMFT promoters should have included these marketing problems to a greater degree in their calculations. "The market cannot be bought with money alone," Fandrich knows.

But even if good-quality marketing and a good product hold out hopes of success, Bonn's concept still contains pitfalls. The term of the loans guaranteed by the BMFT for market introduction is too short: According to this concept it spans 7 years for the maximum sum of DM 2

million, of which usually 2 years are exempt from repayment. By the deadline date of 30 June 1987, 32 TOU firms had taken advantage of this guarantee.

"Most firms need 8 months to 1 ½ years for market introduction," urgently warns Genes employee Helmut Hoff about this credit line, "during which time there is not yet a single worn-out mark in the till." But in order to be able to manage just the interest service, at least a few hundred thousand marks per year, for this loan and possibly for the deficits carried along from Phase II, the new business must earn outstanding profits.

Thus Juergen Weiske of the German Equalization Bank, who looks after the indemnity guarantees for TOU firms in the marketing phase, anticipates a failure rate of at least 20 percent: "Whoever has only a single leg to stand on, namely the TOU product, is really already predestined to suffer a catastrophe." This has been painfully experienced, for example, by Hasso Hofmann, TOU founder of Abdy GmbH in Hamburg. When his product, an electronic circuit with which three-dimensional TV pictures are produced, still had not found a buyer after 2 years then only bankruptcy remained. Without a second product the business did not have any chance of survival. Hofmann is one of the four failed TOU founders for whom the risks indemnity guarantee of the German Equalization Bank has already become payable.

All Are Learning From Their Mistakes

The situation will not end there, because Weiske's warning about founders "with only one leg to stand on" applies to almost 50 percent of all high-tech firms being funded in the TOU model experiment. In adviser circles the expectation is that there will be an even considerably higher failure rate than estimated by the German Equalization Bank for those TOU startups fixated only on a single product: "The figure can easily become 50 percent," fears ISI project head Mayer.

About a dozen entrepreneurs who were already earning money with an engineering bureau before the TOU experiment have abandoned the idea of their own product development and are once again pursuing their old businesses. Others sold their development project in time.

Even the originators in Bonn of the TOU model experiment have by now recognized the pitfalls in their promotional model. To be sure it is being officially said: "The program is an enormous success." But behind the scenes it is already settled that the model experiment will not be extended and will expire on schedule at the end of 1988. And then, says Genes startup consultant Helmut Hoff, for plucky young entrepreneurs with a promising product idea there will be, instead of TOU, once again just ToU: Technology-oriented firms without backing [Tu's ohne Unterstuetzung].

12114

MRST Approves Italian Industrial R&D Project Funds

3698M355 Rome GAZZETTA UFFICIALE DELLA REPUBLICA ITALIANA in Italian No 86, 13 Apr 88 pp 11-19

[Under the rubric: "Decrees and Deliberations of the Council of Ministers"]

[Excerpts] **Minister for the Coordination of Initiatives for Scientific and Technological Research**

Resolution of 1 April 1988

Admission of Research Projects to the Financing of the Special Fund for Applied Research.

The following research projects will receive financing from the Special Fund for Applied Research under the terms of the aforementioned laws. The size of these awards and the related terms and conditions are specified for each project. Said awards comply with Art 15, Par 3 of the law of 11 March 1988, No 67 (1988 Finance Law); therefore, 10 percent of the financing must be used to cover costs related to professional training for researchers and research technicians according to specific regulations still to be defined:

Alfa Romeo Avio S.p.A., Naples (large company classification).
—Location of research: Southern Italy.
—Program: "Innovative Components for Aircraft Engines" (project No 49433).
—Form of financing: easy credit available at an annual interest rate established by Treasury decree; subsidy.
—Maximum amount:
a) easy credit: 8.48 billion lire, for a total not exceeding 40 percent of the allowed costs;
b) subsidy: 8.48 billion lire, for a total not exceeding 40 percent of the allowed costs.
—Duration: 8-year amortization period in addition to the time needed for the research; the latter is not to exceed 6 years and 3 months.
—Amortization: Sixteen equal semi-annual, deferred installments, inclusive of principal and interest, starting from the second due-date following the effective date of completion of the research program.
—Starting date of the research: 1 April 1987.

Centro Sviluppo Materiali S.p.A., Rome (large company classification).
—Location of research: Southern Italy.
—Program: "Single-crystal Precision Casts with Directional Solidification for Aircraft Applications" (project No 49547).
—Form of financing: easy credit available at an annual interest rate established by Treasury decree; subsidy.
—Maximum amount:
a) easy credit: 3.412 billion lire, for a total not exceeding 40 percent of the allowed costs;

b) subsidy: 3.412 billion lire, for a total not exceeding 40 percent of the allowed costs.
—Duration: 8-year amortization period in addition to the time needed for the research; the latter is not to exceed 4 years and 10 months.
—Amortization: Sixteen equal semi-annual, deferred installments, inclusive of principal and interest, starting from the second due-date following the effective date of completion of the research program.
—Starting date of the research: 2 April 1987.
—Special conditions: Guarantee from the Societa finanziaria siderurgica Finsider per azioni—Rome.

Elicotteri Meridionali S.p.A., Frosinone (large company classification).
—Location of research: Northern and Southern Italy.
—Program: "Composite Structures for Helicopters" (project No 49792).
—Form of financing: easy credit available at an annual interest rate established by Treasury decree; subsidy.
—Maximum amount:
a) easy credit: 9.042 billion lire, of which 1.028 billion lire, for a total not exceeding 35 percent of one-third of the allowed costs, equal to 8.813 billion lire, for the north, and 8.014 billion lire, for a total not exceeding 40 percent of the allowed costs, for the south;
b) subsidy: 9.042 billion lire, of which 1.028 billion lire, for a total not exceeding 35 percent of the allowed costs, equal to 8.813 billion lire, for the north, and 8.014 billion lire, for a total not exceeding 40 percent of allowed costs, for the south.
—Duration: 8-year amortization period in addition to the time needed for the research; the latter is not to exceed 7 years.
—Amortization: Sixteen equal semi-annual, deferred installments, inclusive of principal and interest, starting from the second due-date following the effective date of completion of the research program.
—Starting date of the research: 1 September 1987.
—Special conditions: Guarantee from Augusta S.p.A.—Cascina Costa di Samarate (Varese).

Olivetti Peripheral Equipment S.p.A., Ivrea (Turin) (large company classification).
—Location of research: Northern Italy.
—Program: "New General Purpose Printers" (project No 45437).
—Form of financing: easy credit available at an annual interest rate established by Treasury decree; subsidy.
—Maximum amount:
a) easy credit: 3.476 billion lire, for a total not exceeding 35 percent of one-third of the allowed costs, equal to 29.8 billion lire;
b) subsidy; 3.476 billion lire, for a total not exceeding 35 percent of one-third of the allowed costs, equal to 29.8 billion lire.
—Duration: 8-year amortization period in addition to the time needed for the research; the latter is not to exceed 4 years and 6 months.
—Amortization: Sixteen equal semi-annual, deferred installments, inclusive of principal and interest, starting from the second due-date following the effecive date of completion of the research program.
—Starting date of the research: 1 March 1985.

08708/08309

Trieste 'Scientific Pole' Activities, Organization Reviewed

3698M316 Milan BUSINESS in Italian No 3, Mar 88 p 48

[Unattributed article: "The Trieste Area's Science Park"]

[Text] It is the first initiative of the kind in Italy and the only one of its sort up until now. The Trieste Province's Scientific and Technological Research Area is an example of the traditional science park, an interdisciplinary center, without any pre-established agenda.

The Area makes its structures and services available to outside organizations for their own research projects. The structures consist of buildings located about ten kilometers from Trieste, in the Carso region; the services are the usual ones such as telephone, telex, and cafeteria. Director Mirano Sancin, however, explains that the most important task of the Area is to link the university and industrial sectors.

The Area is a public agency established by national legislation. It was created in 1978, became operational in 1981, but really took off in 1986 with the establishment of an endowment fund. Its structure is that of a binding trust in which the regional government, the provincial government, the city government, the universities of Trieste and Udine, the Interuniversity Consortium of Physics Institutes, and the CNR [National Research Council] take part.

At the present time, the Area is involved in three research areas. The first concerns data processing and the software research being conducted by the IRI group's Informatica Friuli-Venezia-Giulia computer firm. The second comprises physics research and concentrates on the synchrotron light machine; Carlo Rubbia is the president of the firm set up for this purpose, Sincrotrone Trieste. Research on the physics of surfaces is also included. The last research area involves biotechnologies. Projects to bridge the gap between countries which are more developed and less developed countries in this sector are being conducted in Trieste. Eventually the less developed countries will hold the patent rights.

The Area also provides financing both in the form of non-repayable contributions and of credits on easy terms. Financing can range up to 70 percent or even 100 percent of the costs of research. The Area is funded by the regional government.

8615/12223

Proposed Agreement on Italian Chemical 'Pole' Reviewed

3698M353 Milan ITALIA OGGI in Italian 23-24 Apr 88 p 4

[Article by Dino Pesole: "Himont and Erbamont in the Chemical Pole: 12-Trillion-Lire Joint Venture"]

[Text] Rome—Montedison's whole chemical section, including Himont and Erbamont, will be involved in the agreement reached with ENI [National Hydrocarbons Organization] for the creating of a large national chemical pole. Indeed, an industrial strategy "markedly oriented toward the development of the Italian chemical sector" requires across-the-board integration between Montedison and Enichem. At any rate, those other activities which, because of their irrelevance to the new objectives and lack of "useful synergies," will be left out of the agreement, must still be considered "viable entrepreneurial solutions."

The above innovations are included in three amendments—passed by a large majority—to the final document on the chemical sector drawn up by the House of Deputies Committee on Production Activities. The document, which was published in yesterday's issue of ITALIA OGGI, will be voted on next week by the deputies. The three amendments (two of which were presented by the Italian Communist Party, while the third was put forward by Mr Gerolamo Pellicano of the Italian Republican Party) have already passed at committee level; however, those announced by the "Greens," which criticize the section concerning research and environment, are still being debated.

Essentially, the document is a very important political action which, in addition to giving the green light for the ENI-Montedison agreement, details the conditions presented to the government by ENI's public owners for the restructuring of the Italian chemical sector. Parliament's resolution will have to be complied with by the Ministry for State Participation, where the ENI-Montedison agreement will be evaluated.

Right of option—Parliament has decided that the new company will have a right of option over possible subsequent cessions of chemical activities by ENI and Montedison, the two groups involved in the operation. Consequently, "any division or alienation of the activity of each group can only take place along the guidelines set forth in the plan for the chemical sector." However, adequate room will have to be made for "small shareholders and minority participations on the part of financial institutions."

The new company—Equal participation of ENI and Montedison in "Enimont" will assure an initial revenue of 12 trillion lire, with "good cash-flow and net profit, both of which can be substantially improved by the expected advantages." Strategic portfolio management will also assure "optimization of the product catalog, reducing its size in weaker areas and increasing it in strong areas."

Public contribution—Parliament regards the ENI-Montedison union as strategically important for the future of the Italian chemical industry. Within the framework of still to be defined operating choices, public involvement cannot be limited to the financial level. "The public sector will have to play an essential role in industry-oriented management."

The new plan for the chemical sector—The revival of the chemical sector can be achieved only within the framework of a new plan coordinating intervention and determining priorities and compatibilities. The chemical sector will have to be adapted to the whole industrial system, combining "the complementary stages of rationalization and development." Basically, the plan is supposed to single out strategic sections for Italy and "define basic options, so as to direct internationalization processes along the desired paths."

Employment—Parliament admits that the above guidelines may lead to job redundancy. However, "only the least skilled workers" are likely to be affected by this problem, whereas the number of highly specialized jobs is expected to increase.

08708/08309

SUPERCONDUCTIVITY

EC Superconductivity Program Launched

3698a238 Brussels EC PRESS RELEASE in English No IP(88) 225, 21 Apr 88 pp 1-2

[Article: "European Cooperation in Superconductor Research: Commission Launches Community Superconductivity Action"]

[Excerpt] The discovery of high-temperature superconductivity, for which two European scientists were awarded the 1987 Nobel Prize in physics, has attracted massive research efforts worldwide. Now a coordinated European response to this technological challenge is being launched.

The Community Superconductivity Action, announced by the Commission today, is designed to promote and support collaborative transnational research in Europe into both the basic properties and the future applications of superconductors.

Superconductivity research in Europe in past years has been carried out mostly by dispersed, relatively small academic groups, with little emphasis on applications. A sustained R&D drive on an adequate scale is needed to make a reality of the benefits promised in a number of areas by this major breakthrough.

In 1987, the Commission initiated a series of consultations with leading scientists, industrial specialists and policy-makers, on whose recommendation a first European symposium on superconductivity was held last July. A high-level scientific meeting was held at the Commission in February this year, and an electronic information exchange network will be set up shortly to support further coordination.

Speaking to a group of distinguished European scientists at the meeting on 3 February, Commission Vice-President Karl-Heinz Narjes said:

"The discovery of high-temperature superconductivity could have great impact on whole industrial sectors over the coming decades. It is our duty to make sure that this discovery for which Professor Mueller and his colleague G. Bednorz so deservedly won the Nobel Prize, finds its way towards timely transformation into innovative products and their integration into the industrial cycle."

Now industrial and academic teams in Europe are being invited to put forward transnational R&D projects in superconductivity for Community support.

The Community Superconductivity Action is designed within existing initiatives that have already proved highly successful in promoting collaborative R&D between companies, universities and research institutes across frontiers. Due to the flexibility of these programmes work can start without delay, in this particularly fast-moving area, on a trans-European basis.

Superconductivity projects related to electronics are invited in the framework of the ESPRIT information technology programme, the five-year second phase of which was formally approved by the Council of Ministers on 11 April 1988. ESPRIT II has total funding of ECU 3.2 billion, 50 percent from the Community, and includes a new chapter of basic research actions also appropriate for the exploration and development of superconductivity. In response to the recent ESPRIT precompetitive R&D call, completed on 12 April, the Commission expects to receive several proposals for superconductivity projects, which if accepted will start soon.

Proposals for twinnings and operations have been submitted to the Stimulation action since fall 1987 and several were already retained by CODEST [Committee for the European Development of Science and Technology]. Applications not directly related to information technologies can be submitted to the Stimulation Programme in basic and applied research.

The call for proposals under the ESPRIT basic research actions is open until 13 June 1988. The Stimulation Programme is open on a continuous basis until the end of 1988.

The Community Superconductivity Action therefore associates the relevant programmes of Directorate-General XII (Science, Research and Development; Joint Research Centre) and Directorate-General XIII (Telecommunications, Information Industries and Innovation).

Close coordination between such programmes will be ensured within the overall Community Framework Programme for Research and Technology Development. In developing this action, the Commission will also be assisted by a high-level advisory panel of research and industry experts, including members of CODEST, the ESPRIT Advisory Board and IRDAC [not further identified].

University-industry cooperation under the Commission initiative will be designed to bring together the most advanced semiconductor and new materials technologies, available only in a relatively small number of industrial laboratories, and the most advanced academic understanding of the chemistry and physics of superconductors, in a drive to develop superconducting materials, technologies and devices with major potential industrial impact.

EC Allocates $50 Million to Superconductivity Research

3698M361 Milan ITALIA OGGI in Italian 23-24 Apr 88 p 32

[Unattributed article: "Europe Closes the Gap With Japan and the United States; Superconductors: The EEC Allocates 62 Billion Lire"]

[Text] London—The EEC is to allocate $50 million (more than 62 billion lire) to finance superconductivity research.

The EEC commission which advanced the proposal, is to establish a scientific commission responsible for selecting the best projects submitted by universities, industries, and European governmental institutes.

The proposal is designed to help European research regain competitiveness with Japan and the United States, in what is viewed as one of the new frontiers of scientific research.

In practice, superconducting materials are capable of transporting electrical energy without any resistance, thus avoiding useless wasting of energy. At least theoretically, there are limitless potential applications of this new technology: In the near future, it will be possible to produce extremely fast computers, achieve enormous progress in energy conservation, design more powerful radars, and so on. Thanks to the EEC allocations, Europeans will be receiving approximately $80 million a year; $60 million will be spent by European governments in 1988.

This is going to bring European investment in this field to a level comparable with Japanese spending. EEC officials specified that Japanese companies are spending more than their European counterparts on superconductivity research and that in the United States $160 million is going to be spent by the government alone this year.

08606/08309

Italian CNR Superconductivity Researcher Interviewed

3698M383 Turin MEDIA DUEMILA in Italian No 4, Apr 88 pp 28-31

[Interview with Cino Matacotta, a researcher at CNR [National Research Center], by Annamaria Tasca; Milan, date not given: "Superconductor Fever"]

[Excerpt] Milan—MEDIA DUEMILA: What is life like for those who are living the "history" of superconductors?

Cino Matacotta: The current situation in the United States and in Japan has all the features of a true and proper "craze." However, it should be said that in these countries the situation has been overdramatized by the media; in reality, there has been a real gap between scientific progress and the business world, to the detriment of the latter. Europe, which is always more cautious, is not the least bit behind from a scientific point of view. Large industrial groups such as Siemens and Philips are conducting solid research without publicizing the most impressive aspects, that is to say those which have the most potential for the future. If anything is lacking in Europe, it is a flourishing small-scale industrial sector capable of very quickly producing high technology products based on these new materials.

MEDIA DUEMILA: Therefore, do superconductor features promise to make substantial progress in a short time?

Cino Matacotta: It is true that these materials have features which we could not have imagined even a short time ago, but it is also true that they have limitations. In May 1987, the Japanese predicted that at most 10 years would be needed to produce what was then only a promise for the future. I do not share this assessment. I believe that it will not be 10 years but 30 or 40. These are materials which are not easy to produce in usable forms. Long and expensive tests have to be conducted. Even if the new material is theoretically superior in certain areas, especially for carrying electrical current without energy dispersion, we have to recognize that it must compete with copper which it will have to replace, and copper has a well-consolidated technology supporting it. Without question the material is revolutionary, but the dust storm which has arisen around the question is creating a little too much confusion.

MEDIA DUEMILA: How do you see the superconductor situation in Italy?

Cino Matacotta: In Italy we got started a little late, but as a result of a well-timed "hot pursuit," we are now on a par with the others. We have to keep in mind that Italian research is conducted by small groups. This necessitates a type of coordination which makes it impossible to obtain good results quickly. The CNR [National Research Council] has involved some 10 institutions in superconductor research with a total of 40 researchers.

As far as the university is concerned, there are certainly several dozen research groups in operation, but it is not possible, at the present time, to give a precise figure. To complete this overview, it should be said that there are other institutions working on this type of research such as ENEA [National Committee for Nuclear and Alternative Energies R&D], ENFN [National Institute of Nuclear Physics], and ENEL's [National Electricity Board] CISE.

MEDIA DUEMILA: What type of financing does this type of research receive?

Cino Matacotta: In July 1987—a few months after the discovery of 'hot' superconductivity—CNR made 2 billion lire available. This, in fact, made it possible for us to compensate for the late start in our research and to obtain results which were internationally recognized. At the beginning, the institutions involved were the 10 institutions already working on advanced materials, although, of course, these institutions had to adapt to new production techniques.

For 1988—and we are already in the month of April—the situation is one of total chaos. In fact, we expected to see a 4-year finalized program with a 40-billion-lire research budget to be awarded to CNR, private industries, and the universities. The trouble is that the program, which was drafted in 1981, makes no provision for advanced materials; therefore, it is out of date before it had even begun. It can be revised, but, even though it was approved in 1987 by the CIPE [Interministerial Committee for Economic Planning], it has not yet been implemented, with consequences which are easy to imagine.

MEDIA DUEMILA: Let's talk now about the discovery of the new material. What is it really?

Cino Matacotta: It is not really correct to talk about a discovery. The story goes like this. On 22 January, a new material was found in Japan made of bismuth, strontium, calcium, and copper. In the United States, the NEW YORK TIMES reported on this new material which becomes superconductor at temperatures a little higher (by 20 to 25 degrees) than those obtained with other materials. I was interested in this rather low-key piece of news which was not inflated like so many others. I tried to do something similar, experimenting with

various formulas using the four metals, and was immediately successful. Rather than a new material, we should, in fact, talk about a family of materials, inasmuch as the proportions [of elements] used can vary without eliminating the superconductivity effect. Now, the outcome is this: The material is potentially superior to the material made of yttrium discovered by Chu in 1987. Up until now, this material has been obtained as a mixture of at least two compounds: one that becomes superconductor at -155 degrees C, and the other at -190 degrees. The problem is to find a material completely made of the substance which becomes superconductor at the higher temperature.

To return to my experiment, it should be said that we nevertheless obtained an important result. Up to a month ago, we could talk about yttrium-based superconductors as a kind of a laboratory joke, devoid of any theoretical backing whatsoever which could explain the phenomenon. The fact that a group of substances similar to each other but different from those found in 1987 has been found opens the way to other discoveries. Thus, the fact that a substance can conduct at a relatively high temperature is a phenomenon which is in no way accidental in nature. It was a surprise for all of us to discover the existence of other superconductors belonging to various chemical families although they were all based on copper oxide.

MEDIA DUEMILA: What are the practical spin-offs from this experiment?

Cino Matacotta: Undoubtedly the first is the incentive to find new materials, especially if we consider that materials made of yttrium have problems transporting high-voltage currents and that different materials can contribute to resolving different problems. However, I would like to remind the reader, that in the case of this new material, we are not talking about a discovery made in Italy, but rather about an experiment conducted elsewhere and repeated here, as in many other laboratories, without knowing how the experiment had been carried out.

Returning to superconductor applications, it should be said that they are already important and irreplaceable, but in fields which have little relationship with everyday life. As far as specific applications are concerned (for example; particle accelerators and biomedical equipment using nuclear magnetic resonance), superconductors are irresplaceable and have a small but well-consolidated market.

MEDIA DUEMILA: What could superconductor applications be in microelectronics?

Cino Matacotta: For microelectronics, the issue is a little different inasmuch as the enemy we have to defeat is no longer copper but silicon. In this case, superconductors are better armed. Once we have resolved the production problems, superconductors could be used to good advantage for special applications (e.g., military, space, research organizations), whereas applications for daily use are still far in the future.

08615/08309

COMPUTERS

Hungary: Role of Data Processing After Year 2000

25020046c Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 6, 23 Mar 88 pp 26-29

[Unsigned article: "Staking Our Future; Data Processing After the Year 2000"]

[Text] We are all responsible for our future. Only if you know where you want to be tomorrow can you proceed securely today. This tomorrow means the beginning of the 21st century too. If the society of today is called an information society—as it is in many places—because of its increased significance and the ever greater numbers of people employed in this area, how much more will this be true in the future!

Inspired by responsibility for the future the Computer Technology Applications Main Department of the KSH [Central Statistics Office] has prepared a study, basically thought through and debated at many forums, titled "Tasks, Conditions and Socioeconomic Interdependencies of Data Processing and the Use of Information Technologies." According to the subtitle this work is "a conception for the long-range planning of the development of data processing with a time horizon extending beyond the year 2000."

Our editors feel an obligation to publish some of the parts of this 47 page study discussing the domestic developmental history of data processing and the role it is to play in the structural transformation of the national economy. Our goal is a double one: on the one hand we would like to aid a realistic evaluation of the path taken, and on the other hand we would like to increase the awareness of the personal responsibility of workers in the area of data processing, for the social necessity and significance of their work and activity increase day by day.

We can conceive of data processing as "dealing with the various motifs of information flow, with the methods of processing and using it, with its effects on productivity and efficiency, with its use for monitoring and supervisory goals and finally with its role in forming socioeconomic development and society" (Data Processing in the Service of Industrial Development, UNIDO-KSH, 1984).

It is difficult to estimate the prospects for its development and its effect on the future of the country not only because of the complexity of data processing but also because the dynamic of the development of information technologies is so unusual. So we can only make use of a few suppositions the kernel of which is already realistic today: the volume of information will continue to grow exponentially, as a result the quantitative and qualitative demands in regard to the information technologies serving to process and manage it will increase also; the dependence of economic and non-economic organizations on one another and their readiness to cooperate are increasing, as a result the exchange of information among them expands on both the national and international scale (the latter is an indispensable condition for the openness of the economy). So being informed is becoming a basic necessity for economic and social action.

In the past 15 years the tempo of the development of data processing has considerably exceeded the average rate of growth for the Hungarian economy.

According to statistical data the managing organizations today operate about 40,000 computers and the number of computers privately owned exceeds 150,000. But our backwardness compared to more developed countries is great. In Austria, for example, every 24th inhabitant had a computer in 1985; here every 86th inhabitant did. The net computer value per 1,000 inhabitants in Austria was a little less than 4 million schillings; in Hungary it was only 0.6 million schillings.

In developed capitalist countries about 30-50 percent of the gross domestic product (GDP) can be traced back to information activities and a third to a half of the labor force has an information occupation. In Hungary, in 1987, about 30 percent of the GDP derived from information activity and one third of the active earners had information occupations. By 2010 this figure will grow to 35-40 percent. All this makes the use of data processing methods and aiding economic and other activities with information technology a commanding necessity.

In the past few years it has been proven in our country too that we cannot give up data processing developments even in a period of slower economic growth, general stagnation or recession, or when investment sources are restricted.

The embedding of information technologies in material and service activities accelerates innovation, their novelty forces innovative solutions and the use of modern tools. With the use of data processing production organization improves, technological discipline increases, stockpiles decrease, the quality is improved, and the throughput times are shortened. Administrative information is better distributed, decisions are made increasingly on the basis of market analysis as well as technical and economic information.

In regard to quality the average domestic data processing applications in the receiving organizations have not yet reached that critical quantity or level above which its effect might be significantly manifested, beyond which the style of the activity, its level of organization, need for equipment and manpower, etc., might move in a more effective, possibly entirely new direction.

In order for data processing to have an effect on the national economy and on the use of information technologies it would be useful to develop the content and organizational framework of data processing services at a pace even greater than the spread of information technologies. In particular, we must do a great deal to propagate telecommunications services. The information produced—like other commodities—must get to the consumer, and this cannot be done with traditional methods.

When data processing carried out in parallel with the economic structural transformation and industrial reconstruction, the use of technological data processing, computer aided production and—at a higher stage of development—computer integrated production, must become reality.

Statistical Snapshot

Computer applications are the most dynamic area for the spread of electronics. By the end of 1986 the various managing organizations owned about 39,000 computers in various categories, a value of almost 37 billion forints. In 1985 the inventory increased by 13 percent in value and by 85 percent in units while in 1986 this growth was 16 and 92 percent respectively.

The growth in the number of computers was differentiated by performance category and was greatest for microcomputers.

Of the microcomputers, 40 percent are school computers, 30 percent have small power and are in the home computer category, and 30 percent are professional machines (Table 1). By the end of 1986 more than 150,000 units, mostly home computers, had been purchased.

Table 1. Computer Inventories for 1985-1986 According to Categories (not counting those privately owned)

	Large		Medium		Small		Micro		Total	
Year	Units	Million forints	Units	Million forints	Units	Million forints	Units	Million forints	Units	Million forints
1985	8	581	249	11,665	2,952	13,611	16,587	5,173	19,796	31,030
1986	25	3,536	297	12,725	1,652	11,543	36,857	9,176	38,831	36,980

Of the computers, 26.3 percent were of domestic manufacture, 9.9 percent came from socialist import and 63.8 percent—including about half of the microcomputers—came from capitalist import. Computer investments rose in parallel with the growth in inventory.

If we study the value of the computers in use within the various economic branches we can find a skewing of the proportions (Table 2).

Table 2. Gross Value of Computer Inventories According to Economic Branch in 1985-1986 (Percentage)

Year	Industry	Construction Industry	Agriculture	Transportation, telecommunications	Commerce	Water management	Other material activity	Health, social, cultural services	Community, public administration services	Total
1985	30.3	5.0	2.4	8.3	6.5	2.2	28.2	9.7	7.4	100
1986	31.7	5.0	3.4	7.0	7.8	2.1	25.6	8.6	8.8	100

Worthy of note is a decrease in the share of the economic branch called "other material activity" (this includes the computer technology organizations) which, in harmony with earlier forecasts, means that to an ever greater degree the individual organizations are solving their tasks with their own equipment. This trend will continue with the increasing spread of microcomputers.

The number of computer technology specialists employed in the socialist sector is 23,600 persons; the average personnel working in domestic partnerships was 14,500 persons. Compared to 1985 the number employed in the socialist sector decreased by almost 7 percent.

Socioeconomic Necessity

In the industrially most developed societies one of the fundamental characteristics of the development of data processing is an acceleration of the rate of development, an increase in the speed of changes. Prices for products and services decrease almost monthly and new devices, systems and services appear on the market with almost the same frequency.

The increasing spread of data processing applications (only to list them—data and information networks, electronic mail, teleconference systems, the informatization of production, state administration, social services and education, leadership information systems, decision preparation and support systems, expert systems) and an increase in the depth to which it is built into the individual application areas raise data processing to an infrastructural factor at a given level.

In our country a preservation of the economic level under the present circumstances is possible only with a flexible transformation of the structure of the economy

and accomodation to the requirements of the surrounding world. The dynamism of the economic structure, its cooperative character, the liveliness of the market, the innovative spirit of developments and the social animation accompanying or a condition for the transformation of the economy carry within themselves the necessity for the development of data processing.

The reverse of the thesis is true also. To the extent that we do not carry out economic structural change the full development of data processing will not be a necessary requirement, because the operation of the present economic mechanism and maintaining the schema for sociopolitical life do not require the placing into operation of data processing systems substantially more modern, faster or more efficient than the present ones.

The example of the developed capitalist countries shows that a period of economic recession is precisely the one in which one cannot give up technological innovation and a modernization of the economy and the social structure but rather one must strive for these by every possible means to prepare for an economic upswing.

If we take the French model as an example we will see that in the de Gaulle era, as a first step, they modernized the backward telephone network and in the 1970's they began an energetic data processing program. This extended not only to the economy but also to postal, financial, commercial and public information data processing services.

The development of such social services is an important element in developing a flexible economic and social structure. But data processing can be a determining factor for a modern economic-social structure not only on the consumer side but also in manufacture, as it is present with great weight in the industrial structure of developed countries. Applying data processing to production, telecommunications, mass communication, social data processing services, household electronic devices, entertainment electronics and electronics for military purposes all presume a volume of goods the manufacture of which requires the preparation not only of the given branch of industry but of all industry and of commerce.

In this way data processing is not only the beneficiary of but also the precursor of structural changes. Fewer and fewer deal with the production of immediate material goods or with material services, and more and more deal with information service for material activities and with other social information activity. The demand for informatic goods and services is growing intensively. There can be no organization which can give up use of the newest achievements of data processing, for this is of fundamental importance from the viewpoint of industrial productivity and the productivity of all other activity. The melding of computer technology and communications not only creates conditions for automated control of industrial production but also radically transforms the service sectors which, as the chief users of information technology, expand with its development, become increasingly flexible while the character and quality of their services change. The areas first affected will be financial, health, transportation, tourist and public information services.

New Requirements in Organization

It must be noted that the environment making use of computer processing and the relationship to the computer have changed. This derives primarily from the fact that the "Chinese Wall" which surrounded the traditional computer center has fallen, that terminals are at the disposal of users, that the user himself has taken the guidance of his fate in hand or has purchased a microcomputer possibly together with ready-made programs which solve applications problems. In either case the user is in direct contact with the computer and solves his daily tasks in the conversational mode, the operative data are given as soon as they arise and the processed results are received immediately.

In accordance with these requirements organizers must think about solutions which are "friendly" to the user, must take their average intelligence into consideration and not build on computer expertise. But domestic experts, unfortunately, overestimate both so it is difficult to use even the simplest text editor (the precondition is that users must take part in a three-day study course).

A natural evolution of matters—thesis, antithesis and synthesis—can be observed in the area of computer applications also. At the beginning of the 1970's we dreamed of integrated control (information) systems, but before they could be realized microcomputers broke up the world of the large central units and computer applications fell into atoms. At the moment we are living the age of the antithesis of the thesis—microcomputers have ever greater capacity and power, they can be linked to each other and to traditional mainframes, as a result local and distant networks are forming, introducing the user to the age of synthesis. They are already united via networks, we call them distributed systems, the unification of which is aimed partly at data transactions and partly at making use of each other's resources and the recources of a large "center."

In the future organization must concentrate on integrating the still separate system elements, at least organizing according to a concept which ensures—a possibility for this is appearing in the area of tools—the conditions absolutely necessary for integration (uniformization or standardization at the level of data, data formats, data carriers, etc.).

Prospective Applications

User attitudes must be influenced in such a way as to provide the factors for increasing the efficiency of the activity of the receiving organization in data processing

and in use of information technologies. A systems approach must continue to be applied which takes into consideration the mutually interdependent logical links of data processing with the activity of the organization and information technologies with one another. In this way the application of data processing to the activity and the uninterrupted modernization of it will become a characteristic of the organization.

Because of the use of data processing, parallel with the industrial reconstruction, technological data processing (computer integrated production) is becoming general. The information connected with manufacturing processes is being integrated with other, still separate information systems originally created for technical planning, management, etc. purposes. The efficiency of product development and design and preparation for manufacture increases with the use of computers. Automated technical design (CAD) is becoming general in every branch of industry (including the construction industry). The design system has a close information link with the electronic testing and diagnostic tools and with the automated manufacturing equipment which together form a computerized design-manufacturing-control system.

The operation of CAD systems requires many and various data, methods and procedures which are available—immediately accessible—in databases. The organizations specializing in this are seeing to the acquisition, processing and accessibility of information suiting domestic needs and are creating links between domestic and international technical-economic information systems. Databanks containing the most modern methods and procedures are helping designing work; electronic databanks are taking the place of manuals.

Expert systems form one of the most promising branches for future trends evolving from the many-sided combination of tools and methods, research connected with artificial intelligence and the growing together of professional areas brought together by data processing and information technologies. Their spread replaces or supplements expertise, gives advice in a well defined, narrow professional area and solves complex (speculative) tasks, usually in conversational cooperation with the user. There is a need for the development and wide use of leadership expert systems to supplment faulty knowledge and offer the many types of expertise rarely existing in a single individual but needed for leadership decisions. Medical use of expert systems (perhaps as an aid to the physician) is very significant because of their lifesaving function. As we see it now the expert systems will open qualitatively new development prospects in social-scale use of the most modern techniques.

For a long time there will be a need for the informatization of business and office work, equipping it with information technologies, for not only in Hungary but throughout the world these areas do not have fully formed developmental trends. Their significance is gigantic, because they affect virtually every member of society through the management of public affairs, not to speak of the ever increasing ratio of employees in this area (already exceeding ten percent). They will considerably reduce overhead costs and through-put times; they can be connected flexibly to other—internal and external—processes. In addition to traditional spoken or written contacts these links will require the most modern telecommunications services (integrated service digital networks—ISDN).

Data Processing Services

In general the products of domestic industry and those imported from abroad are not immediately available to users. So there is a need for intervening, professional service organizations which can trade in these products in a manner satisfying user needs. The content and organizational frameworks of data processing services should be developed at a pace greater than the spread of information technologies in order to have a more vigorous driving effect (emphasizing not so much their commercial character as a character which increases use value).

The problem in the area of data processing services is not that there is not a system serving experimental or demonstration purposes for some unique application but rather that there are obstacles to the mass spread of them. These are interdependent with proliferation and interest questions; in the long run both may be solved only with economic guidance measures.

Of the telematic services (developed as a result of the melding of telecommunications and data processing)—teletext, teledata, teletex and telefax—the most important is teledata, a public version of which is called on to satisfy the most varied needs. In a teledata system one can access one's own and external databases, conduct transactions, transmit messages (electronic mailbox) and even establish international links.

The sphere of providing databases is expanding with the creation of the technical conditions for accessibility. The functioning of professional and interdisciplinary databases aiding producing and marketing activities is especially important; they make possible access to continually up-dated information characterizing a given special area. Personal databases (active memory cards) and their financial, medical and personal identification applications merit special attention because of their public use.

Organizational Specialization

The efficient usefulness of knowledge and information is a necessary component of that process which we call economic structural change.

More and more organizations will specialize in the collection, processing and distribution of information, while the results of their work become a product, a

commodity. We must encourage this specialization, having information become a commodity, for the user of the information product will thus get the information necessary for him more quickly; the up-dating of information will improve and those providing the information product will strive to provide up-to-date news and thus to be competitive with other printed publications and the electronic tools of the mass media. Information will no longer be bound to a place and so access to it will not require from the user the time and expense accompanying change of place.

As a result of all this economicalness will increase (in general the costs of acquiring the information product are substantially lower—often by orders of magnitude—than the cost of traditional information acquisition) so that the selection from an information environment broader than before will also improve the prospects for the correctness of decisions.

Becoming a Commodity

Although economic advantages also accompany having information become a commodity the development does involve certain potential dangers. As information becomes a more significant production factor care must be taken that, realizing democratism and creating equal opportunity, limitations on access to qualified information should be as small as possible. As long as those providing information are guided by economic interests there will be little danger—as a result of the realization of this economic interest—that the sphere of users will be limited. But it becomes problematic if a public institution controls the providing of information. Then there might be the formation of information monopolies which become powerful regulatory tools by defining selective access. On the one hand this is desirable (for example from the defense or internal security viewpoint) but on the other hand it could be inimical to public interests so we must define the sphere of information—out of public administration records—which is freely accessible to all (naturally reimbursing the costs).

The many types of information products and the increase in their number cause the user to become separated from the source of information. Among other things this could make problematic the correctness, completeness and checkability of the information product.

Tasks

Fitting the tasks listed into long-range planning involves scientific and educational policy work on the one hand and economic policy work on the other. Science has the task of developing or adopting modern information and bringing it into the intellectual sphere, of developing methods for the informatic ordering and preservation of such information and building it into information systems. Education has the task of transmitting modern information to individuals and through them to organizations so that everyone has sufficient information to perform his tasks and develop his creativity. The results of data processing, the tools and methods of information technology, must be used to a maximum in this process, building them organically into the educational processes. The economic policy task is to make science and education interested in solving these tasks and seeing to it that knowledge and information get an economic role suiting their value and importance so that their efficient exploitation should contribute to material and intellectual renewed production and the renewed production of service commodities.

The goal of scientific research and development taking place in the area of data processing is a double one. The first is independent research and development in those areas of data processing in which domestic traditions and schools recognized even internationally have formed. This includes certain areas of programming mathematics such as artificial intelligence. The other goal of research and development is adaptation, building the international achievements of data processing into domestic manufacture and use.

But there will always be informatic commodities the domestic development and manufacture of which cannot take place. We can imagine their acquisition only through import. An improvement in this area also can be expected from the development of interest forms more rational than those today. The importing institution and the vendors involved must be made interested in the quality and usefulness (in fitting it into the connecting systems) of the products to be purchased, and in providing service for them too.

Export-import remains not only an economic-financial but also an economic policy question under both capitalist and socialist relationships. The differentiations appearing on the international market for data processing tools and intellectual goods require from our economic policy the development of flexible tactics, together with a constant effort aimed at solving strategic questions (such as relaxing the embargo). So there is need for a link in the market mechanism which will transmit market needs unambiguously and objectively to those making economic policy. This question appears equally in trade conducted with capitalist and socialist states.

Two chief aspects characterize the cooperation of the socialist countries. One appears in the development, manufacture, delivery and servicing of products suitable for the CEMA—primarily Soviet—market. The other appears in the import of tools for the informatization of the guidance, organizational and production systems of domestic institutions. Information technology products take varied forms—in addition to deliveries of traditional computers and intellectual products an increasing share goes to computer technology solutions sold as part

of producing equipment (machine tools, robots, technological lines) and products (vehicles, houshold electronics, etc.). Operating socialist equipment coming from import is one element of the domestic innovation chain.

At present technical level and reliability problems cause tension in the case of large computers and some software, and the system for providing service leaves something to be desired too. Solving the above problems is a key question for cooperation.

In international data traffic the data services centered on technical development are spreading to new areas of scientific-technical progress. Marketing, commercial and financial information is increasing in value, and mutual trade in it is increasing. In the interest of reducing heterogeneity we must step up efforts toward standardization.

Social Aspects

In the future data processing will become a determining element for social innovation, economic growth and development. More vigorously than any other area of technical development it will influence the coexistence of people and the competition of enterprises and national economies. The requirements of economic life, the conditions of work, the professional content of the several occupations, the structure of employment and the ratios of social stratum and class divisions are changing. data processing leads to the creation of new jobs and the abolishing of existing ones. New forms of human coexistence are developing within the family and outside of it. The sphere of possibilities for individual action—and of the responsibilities—is expanding, but the new technical conditions can also lead to reducing personal contacts. The political decision processes are being transformed, it will be much easier to bring the broadest masses into social decisions. It becomes possible to divorce some jobs from the place of work, which increases the possibilities of working at home, and could stop, or even reverse, undesirably great urbanization.

Traditional industrialization and automation are accompanied not only by an unheard of reduction in the price of goods but also by the uniformization of them. The information technologies again carry with them still unforeseeable possibilities for individualization. With the flexible organization and control of production, with the integration of computer aided design and production, the needs of individual customers can be satisfied at a price approaching that of large series manufacture. The most varied services can be individualized in a similar manner, first and primarily education and every form thereof. The technical conditions have existed for some time. We must begin the development and propagation of multimedia educational program packages suitable for individual study, primarily for the continual further training of adults, and especially for leaders.

Social intelligence can be increased only through extensive use of the information technologies. And if we are to recognize the essential aspects of social phenomena and disclose the interdependencies and mutual effects existing among them and make good decisions by correctly judging facts and events on the basis of all this then we must collect and analyse a volume of information for which the intelligence of an individual is too little. Uniting individual information in time and space is possible only by using information technology systems united via an extensive network.

It is a unique aspect of data processing education that the material becomes obsolete very quickly as a result of the extraordinary technical-scientific development of data processing. So supplying society with data processing information cannot be based on school instruction alone, it is also necessary to organize and support other, more flexible instructional forms, primarily study courses. These studies could be organized at the place of work, within the framework of an educational institution or in the form of a small enterprise. Study course instruction offers specialized, modern information; because of its flexibility it can be more effective than the more bound instructional forms.

Since data processing penetrates every area, even housekeeping—largely by way of personal computers—its possibilities can be fully exploited only if everyone is capable of handling the tools. Information must be liberalized on a social scale. Under the conditions of a shortage economy information can only become a shortage item. In this way those who could get information through their contacts would be in a more advantageous situation.

The information technologies are significantly expanding the possibilities of mass communication and the propagation of information. In the case of the printed press data processing increases timeliness and produces radical changes in the printing processes. The role of the traditional press in providing news is decreasing, the significance of electronic news bases and channels is increasing. The borders between individual and mass communications are being washed away, data processing is opening new perspectives for the path leading from a passive information consumer role to active participation in the social communication process—as it is in the area of other public services.

Community Data Processing Services

When we expect a renewal in economic life we must make the same demands regarding communal, social services. The chief goal is to create a legal and economic environment for the economy and society which gives free scope to economic growth, structural change, the development of innovative efforts and development of a suitable infrastructure. This latter must aid the free flow of natural, material and intellectual resources in a manner suiting the dynamically changing conditions. Data

processing services must provide the conditions for the creation and distribution of knowledge and its innovative use and must provide the information, tools and methods (in combination, information systems) needed for effective decision making by local, branch and central organs of state administration.

If state administration is to exercise its functions effectively it needs, in addition to appropriate democratic control, all the necessary information about citizens. So one of the chief goals of long-range development is a full range of basic records connected with citizens, such as:

—up-to-date data on population movement;
—up-to-date data on address records;
—building up a database on property records;
—uniform records on income data of citizens;
—entering specical training of citizens into a database and updating it as needed;
—employment data, tracking manpower flow.

Creating central records and decentralized files connected with national property is a stressed area of state administrative data processing. Digital versions of basic geological survey maps constitute the basis for integration of systems tied to the surface of the Earth. Intellectual property (inventions, patents, etc.) also go into a central database.

The local organs of state administration are in direct contact with the citizens. With the development of the democratism of public life citizens must be able to access the information pertaining to them without real difficulty, without bureaucracy. So efficient information services, making information a public resource, are important. The professional apparatus cannot have an information monopoly; its task is public service, and the development of administrative data processing must serve this.

Role of Foreign Economy

The strategic goal of foreign economy, naturally, is to aid the development of domestic computer culture. Productive activity is the basis of this, as it is for any culture—the information needed comes from the producing sector. In this sense the developed producing sectors of other countries are virtually inaccessible from Hungary (it does not get experienced people from industry across the border), so protecting and defending the developmental level of the domestic computer technology industry against market competition is absolutely necessary. This protection—which is a necessary condition for the development of domestic computer culture—is possible only with regulation of the convertible accounting import of computer tools.

The domestic computer industry is a determining factor in the domestic supply of tools in two respects. The level of capitalist import, compared to the socialist, is high but at the same time we cannot base all our supply on capitalist import—because of the foreign exchange needs. So domestic manufacture satisfies much of our domestic needs (more than 50 percent). The domestic industry produces not only goods—it also produces shortages. The ruble accounting export (a large volume) is directed to shortage markets, and the high profit which can be attained here draws off goods from the country—so we import a shortage. We should note that this shortage, since it is caused by exports, cannot be ended by imports! The shortage can be regulated (but not ended) by withdrawing profit.

So an odd situation has developed. Although the producing capacity of domestic computer technology is unexploited, the domestic market is characterized by a shortage. The ultimate reason for our unused producing capacity is that despite the intentions and measures of the state, which recognizes and represents the national economic interests, we do not "pay" the "price" for our ruble accounting customer markets (that is, the socialist import of computer tools)—because of the "schizophrenia" of our incentive system. This contradiction could seriously hamper our domestic computer development.

The shortage is not temporary, it is permanent—a state of affairs which simply has not been overcome. The capitalist import, which has been increasing greatly in recent years, did not end the shortage, but it did restrict the socialist import.

Our task is to encourage capitalist export—because of its effect on the development of industry primarily but also because of the not negligible foreign exchange yield. We must support the export of software. In the interest of a more efficient use of our existing producing capacity we must strive for a moderate increase in socialist export. We must be thrifty with the productive capitalist import; we must limit the capitalist import of finished products in such a way as not to hinder applications development. The domestic competitiveness of socialist import must be improved.

CEMA Trends

In the future also the cooperation of the CEMA countries will have a determining role in expanding the variety of information technology products, in orienting research and development, in developing the composition of the domestic tools base and in developing the applications level. But there can be no doubt that information technology is one of those areas in which the economic performance of the CEMA countries has lagged behind the possibilities.

A new chance for the development of cooperation is given by the recognition that the forms of contact developed thus far are no longer sufficient for the

acceleration of science and technical progress, the broadening of the mutually advantageous contacts of the member countries or the unfolding of the competitiveness of the national economies.

One can expect the practical realization of the announced program to induce concrete qualitative changes in the producing capacity and structure of the economy by the end of the century and in the period beyond, and for the ripple effect of the program to be noticeable in the other socialist countries as well.

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Hungary: MicroCAD Conference in Miskolc

25020046b Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 6, 23 Mar 88 p 3

[Article by Gitta Takacs: "Peak Technology in Borsod"]

[Text] Quite a number of computer technology exhibits are held in our country every year—perhaps too many. The MicroCAD exhibit held in Miskolc at the end of February was a new and interesting spot of color among them. Peak technology in Borsod? On arriving in the county which may have the most conservative industrial structure in the country many asked this question with some scepticism, although according to sober economic thinking it is exactly the adoption and spread of new techniques and technologies that offers a possible direction for change in this region .

The "C" techniques are attractive to the young. They say that if a CAD system is installed in the design office of a factory it is easier to "populate" it with talented engineers. The initiators and organizers of the MicroCAD meeting were the students of the Miskolc Heavy Industry Technical University.

The three-day meeting was rich in professional programs. There was a seminar titled "The Link Between Enterprise Guidance and Computer Technology," a CAD/CAM conference, an exhibit organized by the Interkosmos Council, a computer technology position exchange and those attending could participate in such ceremonial events of university life as the mechanical engineering students' party.

The exhibitors and other institutions paid 1.3 million forints into the MicroCAD fund; in the future the interest from this will be used to reward outstanding university performance. The winner this year, Tibor Pehl, got 50,000 forints.

In our report we will speak more about the CAD/CAM conference and exhibit, which attracted the attention not only of the local people.

The history of Hungarian CAD is a sad history, Academician Tibor Vamos said when beginning his talk. Modern graphic hardware was made in Hungary in 1971 and they experimented with development of an electronic designing-manufacturing-control system. Hungarian industry did not accept this experiment, unique even in Europe. They tested it at Orion, Videoton and the Communications Engineering Cooperative, but in the end it was a failure everywhere. Economic motivations were effective even despite success.

Domestic engineer training methods are not up to it in an age of complex products made to fit the market; the engineers would have to be armed with economic thinking if they were to be able to place their technical ideas in a market environment. We should train engineers who can orient themselves on the world market with their knowledge of markets and standards, their language knowledge and their systems approach—for a "gap strategy" is the only path which can be followed by Hungarian industry.

The role of international standards is much underestimated in our country, said Laszlo Edelenyi, director general of the Flexys Joint Stock Company, in his analysis. When developing and manufacturing hardware some consideration is given to these but we do not give enough emphasis to the standards problem for software and for communication devices and modules.

Hungarian product and manufacturing development ideas also find it difficult to recognize that sometimes the price of a modern processing machine is only 30 percent of the price of the manufacturing system, and the remaining 70 percent is made up of tools for transportation, service and testing. If the ratios do not "tally" then even a technical development promising nice results can become an economic fiasco.

And let us quote a few—unfortunately alarming—figures from the talk by Adam Wein, a chief worker at the Ministry of Industry. In 1982 the average age of machines used in the machine industry was nine years, in 1986 it was eleven years, by 1990 it will be around sixteen years. The ratio of machines written off to zero but still in operation approaches 30 percent.

Gabor Bojar, chief of the Graphisoft Small Cooperative, spoke about "desk-top engineering." (For the career of this small cooperative see issue 23/1987 of our journal.) Why is it that Hungarian software people were able to get on the capitalist market too with PC CAD systems? Well, it was always vital for a Hungarian programmer to be able to write high powered programs on small capacity hardware. This practice paid off when writing the very computation intensive CAD programs. In addition, at domestic engineer prices it did not bankrupt this small undertaking of 25-30 people when only a few copies were sold of software developed for the Apple Lisa computer with an investment of 10 man-years. And—as we

heard—the Graphisoft Small Cooperative is unable to fill its export markets. If it could get access to modern hardware tools, for example, it might have even more dollar income.

The CAD/CAM exhibit was certainly quieter and more "homey" than the Budapest ones usually are. One could get acquainted with the CAD program systems, for example, much more conveniently and profoundly as they did not have to show their stuff in 5 minutes. Let us mention only a few of the systems shown. For the first time the domestic public could see the MRP-II resource design program package, developed in America and sold by the Flexys company. The Novotrade company and the Inforient Small Cooperative offered a production control system using a new principle. The Tatorg Economic Association called atention to itself with its high powered Hewlett-Packard computer. The Industrial Informatics Center exhibited jointly with the KFKI [Central Physics Research Institute]; they recently set up a joint CAD studio. At the INNOVA-CAD Office stand one could see a PC-Board printed circuit designing program package.

Higher education recently received significant sums to create conditions for CAD/CAM training. The software of Miskolc University which was shown will hopefully become more widely known in the near future; SICELL is a simulation and training program for a manufacturing cell; SILAST is suitable for analog and digital simulation of dynamic systems; and SPINDIN is a conversational mode engineering pre-design and analysis system.

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Hungary: Databases at Academy of Sciences

25020046a Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 6, 23 Mar 88 pp 1, 6-7

[Article by Huba Bruckner: "Rays of Light at the Academy"]

[Text] On 17 March 1826, at the initiative of Istvan Szechenyi, the National Assembly adopted a draft concerning the founding of the Hungarian Scientific Society. Two days later Count Jozsef Teleki laid the foundations for the library of the scientific institution. According to the founding document the collection of 30,000 volumes inherited from his father and regularly enlarged with the publications of Western scientific societies was given "to every citizen of the homeland" in his and his brothers' names.

The library, always short of material resources, storage space and personnel, moved to its present site on the banks of the Danube in 1865. The historic walls now provide room for the most modern information storage and retrieval system, files stored on optical disk. This would surely be applauded by Pal Hunfalvy, the first scientist chief librarian of the library. And the present leaders are proud of it too, for the Academy Library is the first in our country where experts can become acquainted with CD-ROM.

We have reported (issue 3/1988) that—in accordance with the spirit of the founders—anyone can become acquainted free of charge with the new storage and retrieval system which represents the contemporary hit of information technology.

Since the end of last year two CD-ROM search stations have been operating at the Academy, one in the reading room of the library and the other in the department responsible for use development, the Department of Social Science Machine Databases.

A number of factors were considered when selecting the databases; they thought primarily of the needs of researchers, but other goals were popularizing the new possibilities and making up for earlier deficiencies. One weak point in their services proved to be the lack of retrospective literature searches. The optical disk stations help here also.

At present one can use a CD-ROM version of four databases: Dissertation Abstracts Ondisk (DAO), the Grolier electronic encylopedia, the McGraw-Hill CD-ROM Science and Technical Reference and Ulrich's International Periodicals Directory Plus. The information content of each disk is "worth fortunes" to researchers.

800,000 Dissertations

The DAO provides bibliographic data and substantive abstracts on dissertations. The database, published by University Microfilms International, USA (UMI), contains about 800,000 dissertations from 1861 to the present. Each year the file is expanded by an average of 30,000 records; it describes primarily dissertations (PhD and Master level) defended on the North American continent but since 1970, it has been enriched by material from a number of European universities as well.

At the Academy they recognized the outstanding information and documentaion value of the dissertations. (The primary substantive requirement made of dissertations is scientific novelty. The formal expectations include an historical introduction to the theme discussed and a description of the current situation. This requires a high level processing and critical analysis of the professional literature. Thus a dissertation is an inestimably useful document for a critical knowledge of the professional literature. At the same time it offers an insight into the research themes of the receiving institution and into the prescriptions connected with the work.)

Not only can a researcher interested in the dissertations select files meeting the query question he formulates according to his desires but also, if he wants, he can get

copies of them. On the basis of an agreement with the Kultura Foreign Trade Enterprise and the UMI the library can get a microfilm copy of the entire dissertation. Within 6-8 weeks the requester can get a Xerox, bound copy of what he wants, but he must pay 8,700 forints for each dissertation.

Information Storehouse

The Electronic Encyclopedia of Grolier, Inc., is a computer version of the Advanced American Encyclopedia of more than 20 volumes. The McGraw-Hill encyclopedia is similarly rich in content.

The work is a pleasure, done with a work station consisting of an IBM PC/AT and a Hitachi CD-ROM drive supplemented by a printer. The search software, always ready to help, makes things easier for the user.

In every phase of the search, done on the entire text of the file, the machine communicates the current number of hits; in case of need the profile can be broadened or narrowed, looked at and modified. The hits can be printed out.

The individual hits can be studied on the color screen; those words thanks to which the given file was a hit stand out from the text, written in red.

It is true that the CD-ROM is slower than online services working with a mainframe background, but only he who has tried it knows truly what an adventure it is to search through the files, exceeding 500 megabytes. A special advantage is that thanks to the management software one can process the files selected, supplement them with notes or transfer them into other text, and often the management software is combined with a text editor. (The program needed to handle these can also be found on the optical disks.)

After the initial free introduction, in the case of the Dissertation Abstracts, one must pay in the future for a search which can be done with professional help (also), but they have not yet finalized the prices for the service. In our opinion a use fee of, let us say, 500 forints per hour would be far lower than the usual fees for an online service. If we consider that each file may cost 5,000-8,000 dollars to get then we can be even more satisfied with the fee. Use of the encyclopedic files will be free of charge even in the future.

But let us not forget that CD-ROM can never force out the online services, because we can get up-to-date information only online! It is true that the CD files are updated more or less often (some yearly, others monthly), but if one had to change the disks daily it would be senseless to use them and would be economically unjustified.

Catalogs on Disk

In the near future they will get an eight-language dictionary which will be an everyday aid to the library reference service. There are also serious plans regarding the database of Ulrich's International Periodicals Directory. One can find here bibliographic data on virtually all the journals and other periodicals published in the world. If anyone wants to get a new publication it is best if he seeks out the bibliographic data in this file when ordering. A printed version of Ulrich now goes to many libraries in the country. This is a rather expensive document, difficult to handle. The CD-ROM can help a lot. The library will also get the catalog of the American Library of Congress on disk; this is now the basis for library cataloging throughout the world. Its use may simplify computer cataloging and thus the CD-ROM could become a tool for modernizing the work of the library.

It is not unimaginable that—once the technical and legal conditions are clarified—the files stored on disk will be accessible online also, let us say through the I2F net.

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